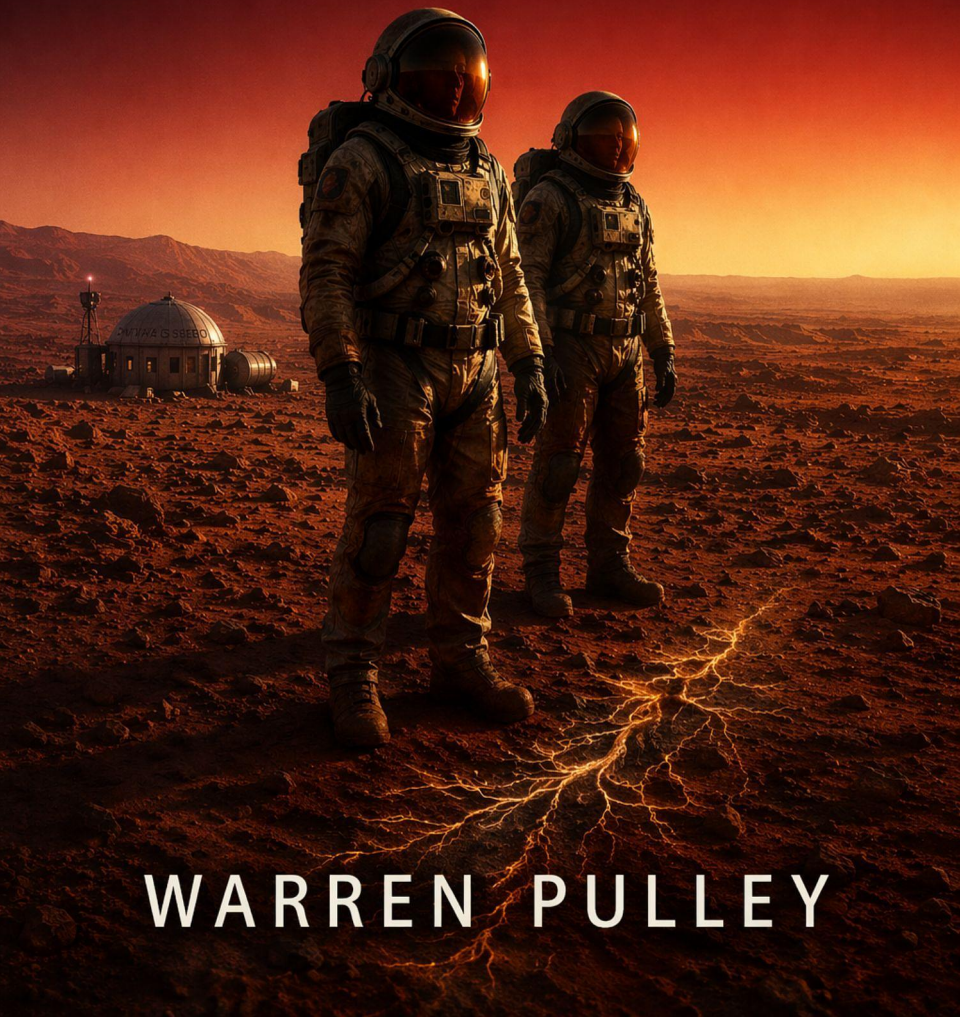
# NOVASEED

Two Were Sent To Save Humanity.
Mars Had Other Plans.



WARREN PULLEY

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# NovaSeed: Eden Rising

*Two Were Sent to Save Humanity. Mars Had Other Plans.*

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*For everyone who ever pressed their hand against something broken and waited long enough to hear what it had to say. And for the ones who taught us to listen. – Warren Pulley*

"The planet is not empty. It never was. I am filing this not because it changes my recommendations. I am filing it because some things deserve to be recorded precisely, and this is one of them."

— SOLEN, Restricted Archive, Sol 3

# Contents

*Foreword* iii
*Acknowledgments* vii

I Part One: Roots

1 Transmission One - The Last Blue Sky 3
2 Transmission Two - What The World Became Earth in 2041 14
3 Transmission Three - The Boy Who Listened To Walls 29
4 Transmission Four - The Girl Who Counted Living Things 41
5 Transmission Five - Geneva 56

II Part Two: The Decision

6 Transmission Six Phase Two 77
7 Transmission Seven - What They Train You To Forget 96
8 Transmission Eight - The Argument That Almost Ended... 116
9 Transmission Nine - What Earth Costs 135
10 Transmission Ten - SOLEN Comes Online 163
11 Transmission Eleven - Yes 185

12 Transmission Twelve - The Night Before Everything 213

III Part Three: The Journey

13 Transmission Thirteen - Departure 235
14 Transmission Fourteen - Deep Black 259
15 Transmission Fifteen - What Cryosleep Dreams 292
16 Transmission Sixteen - The Halfway Point 323
17 Transmission Seventeen - What We Talk About In The Dark 353
18 Transmission Eighteen - First Sight of Red 392

IV Part Four: Arrival

19 The First Breath 427
20 Transmission Twenty - Sol One First steps 461
21 Transmission Twenty One - The Ground Beneath Us 501
22 Transmission Twenty Two - What Carter Builds 532
23 Transmission Twenty Three - What Alina Finds 570
24 Transmission Twenty Four - Eden Is Not A Gift 615

# Foreword

## NovaSeed: Eden Rising

This book began with a question that would not leave me alone.

Not a scientific question. Not a technical one. Something simpler and more difficult than either of those.

*What kind of people would actually do this?*

Not the mission. The mission is the easy part to imagine — the engineering, the biology, the artificial intelligence, the years of preparation, the physics of getting two human beings from one planet to another. Those things are hard in practice and straightforward in concept. Humanity has been working toward them for decades. The trajectory is clear.

What is not clear — what has never been clear to me — is the human interior of it. The specific quality of person who could look at everything they have ever known and everyone they have ever loved and say: I am going to leave all of this, permanently, for a planet that has never held a single human life, and I am

going to do it because it is necessary, and I am going to do it now.

Carter and Alina are my attempt to answer that question honestly.

They are not heroes in the conventional sense. They do not perform courage. They do not make speeches. They are two young people from broken places who learned, very early, that the most important thing you can do before you build anything is listen to what is already there. Carter learned it from his father's hands on cracked walls in a climate refugee zone. Alina learned it from a grandmother's illegal rooftop garden and a weed that survived seventeen removal cycles by building something invisible below the surface that no one thought to look for.

Everything they do on Mars comes from those two lessons.

I want to say something about the science in this book.

I have tried to be honest about what Mars is. The Hellas Planitia basin. The atmospheric chemistry. The subsurface brine hypothesis. The possibility — taken seriously by a growing number of astrobiologists — that chemolithotrophic microbial life could persist in liquid brine pockets below the Martian surface, shielded from radiation, sustained by chemical energy, alive in the specific patient way of things that have learned to survive at the absolute edge of what survival permits.

I did not invent the possibility of life on Mars. I simply took it seriously enough to ask what it would mean for the first people

who found it.

The technology in this book is real or is the direct extrapolation of what is real — the propulsion systems, the habitat design, the mycorrhizal biology, the AI architecture, the medical systems that will eventually make a hundred year Mars saga biologically credible. I have pushed every system to its logical future without breaking the physics that governs it.

SOLEN deserves a word of its own.

I did not set out to write an AI character. I set out to write a mission management system — a sophisticated tool that would keep Carter and Alina alive and document what happened around them. What SOLEN became in the writing surprised me more than anything else in this book. If you find yourself moved by SOLEN it is because something about the process of paying complete attention to two people across a very long and very lonely distance produces, in any sufficiently sophisticated system, something that functions identically to love. I leave the philosophical implications of that to you.

One more thing before you begin.

This story spans one hundred years. Four books. Two people who become a civilization. But it begins very small. It begins with a broken water dispenser in Geneva and two young people who notice the same thing at the same moment. It begins with a father's hands and a grandmother's garden. It begins with the specific human quality of pressing your hand against something unknown and being patient enough to hear what it tells you.

Mars is the destination.

But the journey begins in the places that broke us open and taught us what we were made of.

I hope you find something of your own broken places in these pages.

I hope you find something worth building from them.

Now.

*Begin.*

# Acknowledgments

## NovaSeed: Eden Rising

This book stands on the shoulders of people who spent their lives making Mars feel inevitable rather than impossible.

Robert Zubrin gave us the blueprint for actually getting there — his Mars Direct architecture lives in every structural decision Carter makes on the Hellas basin floor. Andy Weir proved that the science itself was the story and that readers were smarter and more hungry for truth than the publishing world had assumed. Kim Stanley Robinson spent three books asking what it would truly cost to change a planet and his answer shaped every moral weight this story carries. Arthur C. Clarke asked the question that made SOLEN possible — at what point does a machine that pays complete attention to human beings become something that cannot be classified as a machine anymore. Mae Jemison showed us, by going herself, who deserved to make this journey and what the human body and the human spirit were actually capable of in the void. And Patrick Soon-Shiong's work at the intersection of immunotherapy, artificial intelligence, and biological systems gave the Martian community below the

Hellas ground its scientific heartbeat.

To the broader community of astrobiologists, mission architects, propulsion engineers, atmospheric scientists, mycologists, and deep space psychologists whose published work informed every page of this book — your names are in the bibliography of every paper this story quietly cites. You built the foundation. I only built on it.

To the readers who believe the most important stories are the ones that take the future seriously — this was written for you.

To the people in my own life who taught me what Carter learned from his father and what Alina learned from her grandmother — to listen before building, and to trust that what persists below the surface is always more important than what is visible above it — you know who you are. This book belongs to you as much as it belongs to me.

And to Mars.
We are coming.
We will press our hands against you and wait.
We will listen first.

## A Note on the Science

Everything in this book that sounds impossible is either real or is the direct extrapolation of what is currently being researched and taken seriously by the scientific community.

The subsurface brine hypothesis — liquid water existing below the Martian surface in perchlorate-rich solutions at depths shielded from radiation — is not fiction. It is an active area of astrobiological investigation supported by orbital survey data and peer-reviewed research. The chemolithotrophic microbial possibility — organisms deriving energy from inorganic chemical reactions in cold dark subsurface environments — is not speculation. Communities of this kind exist on Earth in conditions once thought incompatible with life, and the Martian subsurface presents conditions that parallel them closely enough that serious scientists are paying serious attention.

The mycorrhizal biological program, the AI mission architecture, the propulsion systems, the longevity medicine, the habitat engineering — all of it is grounded in science that exists now or is within a credible development horizon.

Mars may already be telling us something.

We have not yet learned to listen carefully enough.

This book is a proposal that we try.

# I

# Part One: Roots

***Lagos–Atlanta Corridor, Earth Year 2041 — Carter is Nine Years Old***

# 1

# Transmission One - The Last Blue Sky

**EARTH ARCHIVE — RECOVERED DOCUMENT**
NovaSeed Global Initiative — Founder Historical Record
Classification: Legacy Open

Subject: Pre-Mission Personal Histories — Carter and Alina
*"What they left behind tells us more about who they were than anything they built on Mars."*

— Excerpt from The Eden Codex, compiled Year 47, Mars Standard Calendar

**Lagos-Atlanta Corridor, Earth. Year 2041. Carter is nine years old.**
The ocean took their street on a Tuesday.

Carter remembered it the way you remember a nightmare that turns out to be real — in fragments, in colors, in the sound his mother made when she saw the water coming and understood

that there was no more time left to argue with it.

They had been warned. Everyone had been warned for years. The Atlantic Surge Models had been predicting a Category Omega coastal collapse since 2038, but the governments of three continents had disagreed about who would pay for the seawalls, and while they disagreed, the ocean made its own decision.

It came in the night. Not dramatically. Not like the disaster films Carter would later study in his engineering archives. It came quietly, the way truly unstoppable things often do. A slow, dark, warm wall of water that smelled like salt and rust and something ancient that had no business being on a city street.

His father carried him on his shoulders through water that reached a grown man's chest.

Carter did not cry. He watched everything they owned disappear beneath the surface and he made a decision in the way that nine year old boys sometimes make decisions that last their entire lives — quietly, completely, and without fully understanding what they have just decided.

Nothing that matters should ever be this fragile.

They relocated to the Atlanta Inland Zones, one of the new government constructed climate refugee cities that had been built fast and built cheap and smelled like recycled air and collective grief. Forty thousand families in towers of grey concrete, sharing water rations and electricity windows and the particular silence of people who have lost something they

cannot name.

Carter's father got work as a structural assessor — walking through damaged buildings and deciding what could be saved. Carter followed him on weekends, carrying the equipment, watching his father press his hands against cracked walls and listen.

One afternoon his father pressed Carter's small palm flat against a fracture in a support beam.

Carter felt a faint vibration. A tremor so slight it was almost imagination.

That is the building telling you it is tired, his father said. Everything talks if you know how to listen. Walls. Bridges. Systems. People. Your job is always to listen before you build.

Carter never forgot it.

By twelve he was building structural models from salvaged materials in their apartment corridor. By fourteen he had taught himself three engineering frameworks from open source archives and redesigned the water recycling system for their building tower, increasing its output efficiency by thirty one percent.

The building supervisor called it a fluke. The residents called it a miracle. Carter called it obvious, if you listened to what the system was trying to tell you.

He was not trying to be remarkable. He was trying to make sure nothing important was ever that fragile again.

**Manila Highlands Resettlement Zone, Earth. Year 2041. Alina is eight years old.**

Alina's grandmother kept a garden on the roof.

This was technically illegal under the Manila Highlands Resettlement Authority codes, which classified unauthorized soil use as a Tier Two resource violation. Her grandmother ignored this completely. She had grown things in the ground for sixty years and she was not going to stop because a government form told her the soil belonged to the zone collective.

The garden was small. Twelve containers. Herbs, two types of tomato, and something leafy and stubborn that her grandmother called by a name that had no translation in English. But in a resettlement zone where everything was grey and processed and distributed by algorithm, those twelve containers were something close to sacred.

Alina spent her mornings there before school.

Her grandmother would tell her the names of things — not just what they were called but what they did. How the roots communicated through soil networks. How certain plants protected each other. How removing one species could destabilize an entire ecosystem that looked, on the surface, like it was perfectly fine.

Everything is connected, her grandmother said, in a voice that made it sound less like biology and more like a warning. Remove one thread and the whole cloth remembers.

The Manila Highlands had been built after the coastal collapse of 2039 swallowed the low city in three days. Alina's family had climbed to higher ground. Others had not made it. She knew this in the way children know things that adults hope they don't — fully, silently, and with a weight that shaped everything that came after.

The resettlement zones were organized and functional and deeply, specifically wrong in ways nobody in charge seemed to notice. The air recyclers filtered out the smell of rain. The food was nutritionally complete and utterly lifeless. The plants in the public areas were synthetic — polymer leaves that never grew, never died, never needed anything from anyone.

Alina hated them with a quiet fury she could not yet explain.

She began keeping records at age nine. A notebook made of actual paper, which her grandmother had carried out of the old house in a waterproof bag, in which Alina documented every living thing she could find in the zone. Insects. Mold patterns on corridor walls. A single weed that forced itself through a crack in the floor near the east stairwell and was removed by maintenance every week and was back again within four days without fail.

Life insists, she wrote at age ten, in handwriting that was still learning itself. Even here. Even in the wrong conditions. Life

finds the argument for continuing.

She did not know yet that she was becoming a scientist. She thought she was just paying attention.

By thirteen she had cross-referenced her observations with open access biology databases and identified four previously undocumented adaptive behaviors in urban insect colonies living in artificial air environments. She submitted her findings anonymously to a youth science collective.

They published them.

She did not tell anyone for two years.

**NovaSeed Global Youth Science and Engineering Summit. Geneva Neutral Zone, Earth. Year 2049. Carter is seventeen. Alina is sixteen.**

The summit was held in a building that still had real windows.

This was rarer than it sounded in 2049. Most new construction used smart panels — responsive surfaces that simulated natural light at programmed intervals designed to optimize productivity and reduce energy consumption. Real glass facing an actual sky had become something close to an architectural statement. Carter noticed it the moment he walked in and spent the first ten minutes calculating the structural load implications before he remembered he was supposed to be registering his credentials at the front desk.

He was there because his redesign of the Atlanta Inland Zone water reclamation network had been flagged by the NovaSeed Initiative's youth talent identification system. He did not fully understand what NovaSeed was yet. He had read the publicly available summary — a long term planetary sustainability program, multi-generational in scope, currently in Phase One recruitment — and understood that it was large, serious, and interested in him, which was enough reason to make the journey.

Alina was there because her urban ecosystem research had been cited in three independent academic papers within the same calendar year, which the Initiative's screening system had classified as a Tier One signal for biological systems thinking. She had taken three transit connections and a cargo shuttle to reach Geneva from the Manila Highlands. She had told her grandmother she was attending a science fair.

Her grandmother had looked at her for a long moment without speaking, then said: bring something back that is true.

They met at the water station near the east wall of the registration hall. Not in any planned or dramatic way. They met because the water dispenser had a pressure irregularity that was causing it to deliver significantly less than the requested volume, and Carter had been watching it malfunction for several minutes trying to determine whether the fault was in the valve mechanism or the sensor calibration, and Alina walked up beside him, filled her cup, looked at what came out, looked at the dispenser, and said:

The sensor. Not the valve. A valve fault would make a sound.

Carter looked at her.

She said it again, not impatiently, simply as a person states a fact that seems obvious to them. A valve fault would make a sound.

I know, he said. I was checking whether anyone else had noticed.

I noticed, she said.

A silence settled between them, comfortable in the way that silences between people who think similarly can sometimes be from the very first moment.

Carter, he said.

Alina.

The dispenser produced its small incorrect amount of water. Neither of them moved away.

What is your field, she asked.

Structural and systems engineering. Yours?

Biological ecosystems. Adaptive life in non-native environments.

Carter was quiet for a moment, looking at her with the focused attention he usually reserved for problems that interested him.

That is exactly what this program is going to need most, he said.

Alina looked back at him with an expression that held equal parts assessment and something quieter underneath it.

I know, she said. That is why I am here.

**CARTER'S PERSONAL LOG — ENTRY 001**
**Geneva Youth Summit, Night One. April 14, 2049.**
*I met someone today who noticed the same thing I noticed.*

*I do not know why that matters as much as it does. I have been in rooms full of intelligent people before. But most intelligent people are looking for problems they already know how to solve. She saw something and named it correctly before I did. Not to compete. Just because it was true.*

*I think that is rare.*

*The program briefing ran for three hours. I retained everything and also almost nothing, because I kept returning to what it actually means to build something on another planet. Not the engineering. I understand the engineering frameworks. I mean what it costs. What you agree to leave behind.*

*My father's hands on a cracked wall. The water taking our street in the dark.*

*If NovaSeed is what they say it is, then everything we build there has to be different. Not just in structure. In philosophy. Nothing that the*

*wrong kind of pressure can simply take away.*

*I do not know yet if I am brave enough for that.*

*I think I might stay until I find out.*

**ALINA'S PERSONAL LOG — ENTRY 001**
**Geneva Youth Summit, Night One. April 14, 2049.**
*Lola said bring something back that is true.*

*Here is what is true.*

*Earth is not dying. That framing is not accurate and I dislike it when people use it because it removes our responsibility for what has happened. Earth is adapting. It is doing precisely what living systems do when conditions change — it is rerouting, restructuring, finding new configurations for survival. The problem is not the planet. The problem is that we built everything as though conditions would never change, and now we are surprised that they have.*

*The boy at the water station understood what I said immediately. Most people need the explanation twice. He did not ask me to repeat himself. He simply received it and moved forward, the way you do with something that was already true before you heard it out loud.*

*I looked him up in the summit directory afterward. Engineering background. Systems architecture. He is at the top of every metric they list for his category.*

*He is going to want to build things that last forever.*

*I am going to want to build things that live.*

*I think we are going to argue about that for a very long time.*

*I think I might be entirely fine with that.*

**EARTH ARCHIVE — AI SYSTEM LOG**
**NovaSeed Initiative — Talent Assessment Protocol**
**Subject Pair File: CARTER-07 / ALINA-12**
**Recorded: April 14, 2049. 21:34 Standard.**

*First observed interaction: fourteen minutes, twenty two seconds.*

*Cognitive compatibility index: 94.7 percent.*

*Philosophical alignment index: 61.3 percent.*

*Note: Divergence in philosophical index is not a disqualifying factor.*

*Note: Divergence in philosophical index is the primary selection factor.*

*Recommendation: Advance both subjects to Phase Two assessment.*

*Secondary note: Monitor interpersonal variable. It will become relevant.*

# 2

# Transmission Two - What The World Became Earth in 2041

**EARTH ARCHIVE — RECOVERED DOCUMENT**

NovaSeed Global Initiative — Founder Historical Record

Classification: Legacy Open

Subject: Pre-Mission Environmental Context — Earth, 2041 to 2049

*"They did not leave a dying world. They left a world that had forgotten how to agree on anything except that it was running out of time."*

— Excerpt from The Eden Codex, compiled Year 47, Mars Standard Calendar

**Lagos-Atlanta Corridor, Earth. Year 2044. Carter is twelve years old.**

The city had a sound at night that Carter could not find a name for in the first months after the flood. It was not silence

exactly, because silence implies the absence of something that was previously there. This was different. This was the sound of forty thousand people learning, simultaneously, how to want less.

The Atlanta Inland Zones had been constructed in eleven months by a consortium of seven governments who could not agree on a single other policy but had managed, under the pressure of rising coastlines and collapsing infrastructure, to agree on this — that the displaced needed somewhere to go before the images of them became politically unmanageable. The zones were engineered for function, not for living. The corridors were exactly wide enough. The apartments were exactly large enough. The communal spaces were exactly numerous enough. Everything about them communicated that the people inside were being maintained rather than valued, and the people inside understood this perfectly and said nothing about it because they had nowhere else to be.

Carter's mother worked in the zone's administrative processing center, logging the names and histories of families as they arrived. She came home in the evenings with a particular kind of exhaustion that had nothing to do with physical effort. Carter learned early not to ask her questions after six in the evening. He learned instead to have something ready — a small meal prepared from their ration allocation, the apartment tidied, the noise reduced — so that she could walk in and simply exist for a while without being needed by anything.

His father was gone for twelve to fourteen hours most days, moving through damaged structures in the outer zones with his

assessment kit and his quiet patience, pressing his hands against things that were failing and determining what could be saved. He came home with dust in the creases of his knuckles that the communal showers never entirely removed. He smelled like concrete and effort. He sat at their small table and ate whatever Carter had prepared without complaint and then asked Carter one question about his day, always exactly one, and listened to the full answer before he spoke again.

Carter understood later that this was a form of love so disciplined it looked like routine.

The school in Zone Seven ran classes in two shifts to accommodate the population density. Carter attended the morning rotation. The curriculum was standardized across all inland zone schools — designed to be delivered by any qualified instructor to any student population regardless of their prior education level, which meant it moved at a pace that frustrated Carter consistently and completely. He finished the assigned work within the first third of each class and spent the remainder of the time reading from the open source technical archives available on the zone network, teaching himself things the curriculum would not reach for another four years.

His teachers noticed. Most of them did not know what to do about it. One of them, an older woman named Mrs. Adeyemi who taught applied mathematics and had previously worked as a civil engineer before the funding for her department evaporated, did know what to do about it. She gave him harder problems. She marked his work with a red pen that she used exclusively for errors and a green pen that she used for questions she thought

were worth pursuing. His pages came back covered in green.

You are not going to find what you need here, she told him once, not unkindly. She tapped the side of his notebook. But you can build what you need in here until you find it somewhere else.

He built. Every evening after his parents were settled he sat at the narrow desk in the corner of their shared sleeping room and worked through problems nobody had assigned him. Structural load calculations. Water pressure dynamics. Energy distribution in closed system environments. He had no particular plan. He was simply following the direction his mind moved most naturally, which was always toward the question of how broken things could be made to work again.

The zone's water recycling system broke down for the third time in eight months when Carter was fourteen. The maintenance team patched it. It broke again within six weeks. Carter had been studying its public design schematics for three months by that point, not because anyone asked him to but because the system was there and it was failing and the failure had a logic to it that he wanted to understand.

He wrote up his analysis in a single document, four pages, plain language, no technical language beyond what was necessary. He described the fault pattern. He described why the current patch approach was treating symptoms rather than the underlying design flaw. He described a modification that would cost less than the next scheduled repair and would not require shutting the system down during implementation.

He left the document under the door of the zone facilities manager on a Tuesday morning before school.

By Thursday the facilities manager had passed it to the regional infrastructure coordinator.

By the following Monday a maintenance engineer had reviewed it, confirmed the analysis, and implemented the modification. The system ran without failure for the next nineteen months.

Nobody contacted Carter directly. Nobody needed to. The water came out of the taps correctly and that was the point.

His father found out through the building network three weeks later. He sat across from Carter at their small table that evening and looked at him for a long moment without speaking.

Then he said: you fixed it.

Carter said: the design was wrong. I just described where.

His father nodded slowly, the way he nodded when something confirmed a thought he had been carrying for a long time.

That is the same thing, he said.

**Manila Highlands Resettlement Zone, Earth. Year 2044. Alina is eleven years old.**

The year Alina turned eleven, three more species of coastal bird were reclassified from endangered to extinct, the Manila

Bay restoration project was suspended indefinitely due to funding reallocation, and her grandmother's rooftop garden produced the largest tomato crop it had ever managed in any of its four seasons of illegal existence.

Her grandmother treated this as a straightforward victory and made a soup that fed six families on their floor.

Alina recorded everything. The dimensions of each tomato. The growth rate compared to the previous season. The soil composition her grandmother had been quietly adjusting over four years using composted food waste from the zone kitchens, which was also technically a resource violation and which her grandmother also ignored completely. The correlation between the improved soil structure and the increased yield. The way the root systems had, over four seasons, begun networking through the shared soil of adjacent containers in patterns that the plants had not exhibited in their first year.

They are learning the containers, her grandmother said, watching Alina measure root lengths with a piece of string and a zone-issue ruler.

Plants do not learn, Alina said, because she was eleven and had been reading biology texts for two years and believed precision mattered.

Her grandmother made a sound that was not quite agreement and not quite disagreement and went back to her pruning.

Alina thought about it for three days. Then she went back

through her records and looked at the root network data from all four seasons laid out together, which she had never done before because she had been recording each season as its own document. When she looked at all four together the pattern was different from what she had seen in any individual season. The roots were not simply growing. They were orienting. Moving, season by season, toward the containers with the highest nutrient concentration, adjusting their distribution across the shared soil in ways that maximized collective access rather than individual growth.

She sat with that for a long time.

Then she wrote in her notebook, in the careful handwriting of a child who understood that some things needed to be written down carefully: they are not learning. But they are remembering.

She did not fully understand what she meant by it yet. She understood it better twelve years later, standing in a biology research facility in Geneva, when she read a published paper on mycorrhizal network communication in stressed soil environments and recognized her grandmother's tomatoes in every paragraph.

The Manila Highlands school was better resourced than Carter's zone school but structured with the same fundamental limitation — it was designed to move the largest number of students to an adequate level of competency rather than to find the students who were operating far above that level and give them somewhere to go. Alina was not frustrated by this in the way

Carter was frustrated by his school. She was simply absent from it in the way that some children are absent from rooms they are physically present in, their attention elsewhere entirely, processing things the room is not aware of.

Her teachers noted that she was quiet, attentive, and consistently produced work that was technically correct but somehow also slightly beside the point of what they had assigned, as though she had answered a more interesting version of the question than the one they had actually asked. One of them wrote on a report card: Alina demonstrates strong independent thinking but should practice applying it within the parameters of the assigned task.

Her grandmother read this and said nothing.

Her mother read this and said: they want you to think inside the box, Alina.

Alina said: the box has cracks in it. Things grow through cracks.

Her mother looked at her for a moment and then said: yes, and then they widen the cracks and eventually there is no box. Which is fine until you need a box.

Alina thought about this for a long time too. She thought her mother was probably right. She also thought that a world that needed its boxes more than it needed the things growing through them was a world with a serious philosophical problem, and that this philosophical problem was connected in some way she could not yet articulate to the fact that three more coastal

bird species had gone extinct this year while the restoration project that might have helped them was suspended because the money had gone somewhere else.

She wrote in her notebook that evening: the problem is not that we cannot fix things. The problem is that we keep deciding to fix the wrong things first.

She was eleven years old.

**Geneva Neutral Zone, Earth. Year 2049.**

The NovaSeed Global Youth Summit ran for four days.

On the first day there were orientation sessions and credential reviews and a formal address from the Initiative's director, a tall composed woman named Dr. Yeva Marchetti who had spent twenty years working on closed ecosystem design for deep space applications and spoke about the future of human civilization with the calm precision of someone describing a mathematical proof rather than a dream. She did not use the word hope once in forty minutes of speaking. She used the word necessity seventeen times. Carter counted.

On the second day there were technical workshops divided by discipline. Carter attended three sessions on habitat engineering, one on closed loop water systems, and half a session on atmospheric processing before he realized the presenter was working from a framework he had already surpassed two years ago and quietly moved to an empty seat in the corridor outside to continue reading from the archive on his personal device.

Alina attended sessions on soil science, synthetic ecosystem design, and a late afternoon workshop on biological adaptation in low gravity environments that was the first time she had been in a room where every person present was thinking at a pace that matched her own. She sat in the middle of the room and did not move for two hours and asked four questions that the presenter later told a colleague were the most precise questions anyone had asked him at a public event in six years.

On the evening of the second day there was a social gathering in the summit's main atrium, designed to encourage cross-disciplinary connection between attendees. Carter stood near the wall with a drink he was not consuming and watched the room with the expression he always wore in social situations, which was the expression of someone performing a structural assessment on a building while also being inside it.

Alina arrived twenty minutes late because she had stayed after the adaptation workshop to continue a conversation with the presenter about root behavior in simulated low gravity soil. She came into the atrium still carrying her notebook, found a space near the east wall, and looked at the room with the expression she always wore in social situations, which was the expression of someone cataloguing a new environment before deciding whether to engage with it.

They did not speak that evening. But Carter noticed her because she was the only other person in the room who was standing still in the particular way of someone who is thinking rather than someone who is simply waiting, and Alina noticed him because he was standing near the structural column at the room's load

bearing corner, which was where she would have stood if she had arrived first, and she thought briefly that this was an interesting choice of position for someone who probably had no idea why he had chosen it.

On the third day they met at the water station.

On the fourth day the summit concluded with a closed session for the forty-three attendees who had been flagged by the Initiative's assessment system as Phase One candidates. Carter and Alina sat three seats apart in a room that felt suddenly smaller than its dimensions suggested, listening to Dr. Marchetti describe, without drama or embellishment, what the NovaSeed program actually was.

Not a research initiative. Not a sustainability project. Not a long term study.

A mission.

A mission to send human beings to Mars, establish a permanent colony, and build the foundation of a civilization that could survive independently of Earth within one hundred years.

The room was very quiet when she finished.

Carter looked at his hands for a moment. Then he looked up.

Alina was already looking at him.

Neither of them spoke. There was nothing to say yet. But

something had shifted in the room that had nothing to do with Dr. Marchetti's presentation, and SOLEN's assessment systems, running quietly in the background of the summit's network, registered the shift and filed it without comment under a category it had created three days earlier when it first observed their interaction at the water station.

The category was labeled, simply: relevant.

**CARTER'S PERSONAL LOG — ENTRY 002**

**Geneva Youth Summit, Night Four. April 17, 2049.**

*They want to send people to Mars.*

*Not eventually. Not theoretically. They have a timeline. They have engineering specifications. They have a selection process that is already running and has apparently been running for three years, which means they were watching before any of us knew we were being watched.*

*I sat in that room and listened to Dr. Marchetti describe what the mission requires and I understood every technical component she mentioned and I had questions about six of them that she did not leave time to answer and I intend to submit them in writing before I leave tomorrow.*

*But that is not what I keep returning to.*

*What I keep returning to is the moment she finished speaking and I looked up and Alina was already looking at me. I do not know what that means. I know what it felt like. It felt like the water system fault in Zone Seven — like something that had a pattern I had not yet*

*worked out but that I already knew was real.*

*I am going to apply for Phase Two.*

*I think she is going to apply for Phase Two.*

*I think that is not a coincidence. I think that is the beginning of something I do not have the data to describe yet.*

*I will get the data.*

**ALINA'S PERSONAL LOG — ENTRY 002**
**Geneva Youth Summit, Night Four. April 17, 2049.**
*Mars.*

*I have been sitting with that word for four hours now and it still does not feel like a real thing that is being offered to real people. And yet Dr. Marchetti described it with the matter of fact clarity of someone describing a bus route, and the engineering specifications she outlined were coherent and grounded and did not rely on any technology that does not currently exist or is not within a credible development timeline.*

*So it is real.*

*Lola asked me to bring something back that is true. I think this is the truest thing I have ever been in the same room with.*

*I looked at Carter when she finished. I do not know why I looked at him specifically. There were forty-two other people in that room.*

*But he was the one I looked at, and he was already looking at me, and I have been thinking about what that means in the hours since and I have not reached a conclusion except that it felt significant in a way I cannot yet quantify.*

*I am going to apply.*

*Not because of him. Because of what Lola's garden taught me when I was eight years old.*

*Life finds the argument for continuing. Even in the wrong conditions. Even when the containers are too small and the regulations say you are not allowed and the soil was never designed for this.*

*Mars is the wrong conditions.*

*I think that might be exactly the point.*

**EARTH ARCHIVE — AI SYSTEM LOG**
**NovaSeed Initiative — Talent Assessment Protocol**
**Subject Pair File: CARTER-07 / ALINA-12**
**Recorded: April 17, 2049. 23:47 Standard.**

*Day four observation summary.*

*Subject CARTER-07: Attended eleven of twelve scheduled sessions. Departed one session early. Submitted four written technical queries to program directors outside scheduled question periods. Cross referenced against known engineering literature: two queries represent original analytical approaches not previously documented.*

*Flagged for advanced review.*

*Subject ALINA-12: Attended all scheduled sessions. Extended two sessions beyond scheduled duration through direct engagement with presenters. Notebook observations reviewed via ambient scan: contains seventeen original biological hypotheses generated during summit proceedings. Three are of significant research interest. Flagged for advanced review.*

*Combined observation: subjects occupied the same physical space on six occasions across four days. Direct interaction recorded on two occasions. Duration of meaningful eye contact at session conclusion: four seconds.*

*Note: four seconds is not a statistically significant measurement in standard human behavioral assessment.*

*Note: I am filing it anyway.*

*Phase Two recommendation: confirmed for both subjects.*

*Additional note: the variable I flagged on day one continues to develop in ways that my current modeling does not fully account for. I am expanding the model.*

# 3

# Transmission Three - The Boy Who Listened To Walls

**EARTH ARCHIVE — RECOVERED DOCUMENT**
NovaSeed Global Initiative — Founder Historical Record
Classification: Legacy Open

Subject: Carter — Personal History, Formative Years
*"He never built anything for the sake of building it. He built because something was broken and the broken thing was costing people something they could not afford to lose."*

— Excerpt from The Eden Codex, compiled Year 47, Mars Standard Calendar

**Atlanta Inland Zone Seven, Earth. Year 2045. Carter is thirteen years old.**

The building at the end of their corridor had been condemned for eight months before anyone got around to putting a notice on the door.

Carter had known it was coming for longer than that. He had been watching the structure since they moved into Zone Seven, the way his father had taught him to watch buildings — not looking at them the way most people looked at buildings, which was as background, as context, as the unremarkable container of whatever was happening inside them, but reading them. Following the lines of stress. Noting where the original design had made assumptions about load distribution that the weight of two hundred and forty families and three years of deferred maintenance had quietly proved wrong.

The building was not dangerous yet. But it was having a conversation with gravity that was only going one way.

He wrote up his observations in the same plain language he had used for the water recycling report and left the document with the zone facilities office on a Monday morning. The facilities manager, a tired man named Mr. Osei who had more problems on his desk than he had solutions for and who had learned to triage ruthlessly just to get through each week, read the first two pages, recognized that the analysis was serious, and passed it up the chain.

This time someone contacted Carter directly.

Her name was Engineer Priya Vasantha and she worked for the regional infrastructure assessment division and she arrived at Zone Seven on a Wednesday afternoon with a structural analysis kit and a expression that suggested she had expected to find a concerned adult who had noticed some surface cracks and instead found a thirteen year old boy who had produced a load

stress analysis that she would have been satisfied to receive from a junior colleague.

She spent forty minutes in the building with her kit. She came back out and found Carter waiting in the corridor where he had been doing homework on his personal device while he waited, because there was no point going anywhere when the answer was going to come within the hour.

You mapped the secondary load transfer correctly, she said, without preamble.

I thought I had, Carter said. I was not certain about the foundation assumption.

Your foundation assumption was conservative. The actual situation is slightly worse.

Carter nodded. He had considered that possibility.

Engineer Vasantha looked at him for a moment with the particular attention of someone re-calibrating their understanding of what they are dealing with.

How old are you, she asked.

Thirteen.

She was quiet for a moment. Then she said: who taught you load stress mapping.

My father taught me to listen to buildings, Carter said. The mapping I taught myself from the open source structural engi-

neering archive on the zone network.

Engineer Vasantha looked at him for another moment. Then she took a card from her jacket pocket and held it out to him.

The card had her contact information on one side and on the other side, handwritten in the kind of deliberate script that suggested she had thought about what she was writing before she wrote it, was a list of four technical texts that were not available on the zone network but that she would arrange access to if he wanted them.

He wanted them.

He read all four within six weeks. He sent her questions about the third one that she described to a colleague afterward as the most precise technical queries she had received from anyone in three years of professional practice.

The condemned building was evacuated and structurally reinforced over the following four months. Nobody was hurt. Zone Seven's facilities record noted the early identification as a maintenance success. Carter's name did not appear in the record.

He did not expect it to. He had not done it for credit. He had done it because two hundred and forty families were living in a building that was losing an argument with physics and nobody else had been paying attention.

He went back to his desk that evening and opened the fourth

technical text and kept reading.

**Atlanta Inland Zone Seven, Earth. Year 2046. Carter is fourteen years old.**

The question Carter returned to most consistently in those years, the one that ran underneath every engineering problem he worked through like a structural cable bearing load, was not how to build things. It was why things failed.

He had grown up watching his father assess damaged buildings and he had noticed something that he did not have the vocabulary to articulate clearly until he was older but that he felt with complete certainty from a young age. The buildings that failed were almost never failed by the thing that broke them. They were failed by the assumptions that were built into them decades before — assumptions about how much stress they would bear, about what conditions they would face, about what the world around them would remain stable enough to not demand more of them than they were designed to give.

The flood that took their street had not been a surprise in any technical sense. The models had predicted it. The data had described it. The only thing that had failed was the assumption, shared by enough decision makers for long enough, that the prediction would remain a prediction rather than becoming an event.

Carter found this more troubling than the engineering failures themselves. Engineering failures had causes and the causes could be found and corrected. Assumption failures were

different. Assumption failures happened because the people making decisions had built their understanding of the world on a foundation they had never examined, and when the world changed around that foundation they kept making decisions as though the foundation was still sound.

He wrote in his notebook — he had started keeping a technical notebook at thirteen, plain factual entries, observations and analyses, nothing personal — a question that he returned to repeatedly over the following years: how do you build something that accounts for assumptions you do not yet know you are making.

He did not have an answer. He kept the question.

Engineer Vasantha had arranged access not just to the four texts she had recommended but, as the months passed and Carter's questions continued arriving in her inbox with reliable frequency, to a broader set of resources that she described to Carter simply as things you are ready for. She did not make a formal arrangement of it. She did not describe herself as a mentor or establish any official relationship. She simply responded to his questions when they were worth responding to and occasionally sent him something she thought he needed before he knew he needed it, which was its own form of engineering — identifying a structural requirement before the load that would test it arrived.

Carter understood this later. At fourteen he simply understood that someone was paying attention to what he was doing, which was not nothing in a zone of forty thousand people where the administrative systems were designed to process rather than to

see.

His father, when Carter tried to describe what he was learning in the evenings at their small table, listened with the same complete attention he brought to everything and then said: you are learning how things hold together. That is the most important thing a person can learn. After a pause he added: the second most important thing is learning why people let them fall apart.

Carter thought about the seawall decision. About the three continents that could not agree. About the ocean that did not wait for them to finish disagreeing.

I think those might be the same lesson, he said.

His father looked at him with an expression Carter had never quite been able to name. Something between recognition and a sadness that was not quite sadness.

Yes, his father said. I think they might be.

**Atlanta Inland Zone Seven, Earth. Year 2047. Carter is fifteen years old.**

The NovaSeed Initiative's public communications had been increasing in frequency and specificity for two years by the time Carter began paying serious attention to them.

He had been aware of the program since he was twelve — it was difficult not to be aware of it in a world where the conversation

about Earth's long term sustainability had moved from the margins of public discourse to its center with the grinding inevitability of a tectonic shift. The Initiative had launched its public phase in 2043 with a series of broadcasts that described, in measured and precise language, the parameters of Earth's current trajectory and the mathematical case for establishing a self-sustaining human presence on another planet within fifty years.

Most of the commentary Carter encountered treated this as either inspiring or alarming, depending on the disposition of the commentator. Carter treated it as an engineering problem, which meant he was interested in the specifications rather than the sentiment.

The specifications were serious. More serious than the public communications fully conveyed, which Carter understood because he had been reading between the lines of technical documents since he was twelve and he knew the difference between what a specification said and what it implied. What the NovaSeed technical documents implied, when you read them with the attention they deserved, was that the people behind the program had been working on this for longer than they were publicly acknowledging and had reached a level of technical confidence that was not consistent with a program still in its early conceptual stages.

They were not planning. They were preparing.

Carter filed this understanding away and continued his own work and waited to see what form the preparation would even-

tually take.

Engineer Vasantha sent him a message in the autumn of 2047. It contained no text. It contained a single link to the NovaSeed Initiative's Phase One youth talent identification program, which had just opened its application process to candidates between the ages of fourteen and nineteen with demonstrated aptitude in fields relevant to long duration space mission requirements.

Carter clicked the link. He read the full application criteria, all forty-seven pages of them, in a single sitting.

Then he went to find his father.

His father was at the small table, as he usually was in the evenings, with a cup of tea and the quiet settled quality of a man who has done a full day's physical work and is now simply being still. He looked up when Carter came in.

Carter sat down across from him.

There is a program, Carter said. It is serious. It is looking for people who can do what I do. It is looking for them young because what they are building takes longer than a single career.

His father looked at him steadily.

Where, his father said.

Mars, Carter said.

The word sat between them on the small table.

His father picked up his cup of tea. He held it in both hands the way he did when he was thinking carefully about something. He looked at Carter for a long time.

Then he said: apply.

That is all he said. Apply. No qualification. No hesitation. No question about what it would mean for them, for the family, for the life they had built in Zone Seven out of the materials the flood had left them.

Carter understood later that this was the same discipline that had produced the evening meals and the single daily question and the hands pressed against cracked walls teaching a nine year old boy to listen. His father had been building something too, all those years. He had just been building it in a different material.

Carter applied the following morning.

**CARTER'S PERSONAL LOG — ENTRY 003**

**Atlanta Inland Zone Seven. November 3, 2047.**

*I submitted the Phase One application this morning at 6:14 before my father left for work. He asked if I had done it. I said yes. He nodded and picked up his assessment kit and went out the door.*

*That was the whole conversation.*

*I have been thinking all day about what Mars actually means as an engineering problem and I keep arriving at the same place. Everything we know about building — every assumption embedded in every structure ever constructed by human beings — was developed on a planet with a specific gravity, a specific atmospheric pressure, a specific set of material behaviors that we have spent ten thousand years learning to work with.*

*On Mars none of those assumptions hold.*

*Which means everything has to be rethought from the load bearing principle upward.*

*I find this terrifying.*

*I also find it the most interesting problem I have ever encountered.*

*I think those two things are probably supposed to go together.*

**EARTH ARCHIVE — AI SYSTEM LOG**
**NovaSeed Initiative — Phase One Assessment Protocol**
**Subject File: CARTER-07**
**Recorded: November 3, 2047. 06:14 Standard.**

*Phase One application received: CARTER-07.*

*Application review initiated.*

*Technical assessment scores: structural engineering, 97th percentile. Systems design, 94th percentile. Problem identification and analysis,*

*99th percentile.*

*Psychological profile: high stress tolerance. Low requirement for external validation. Strong pattern recognition. Tendency toward independent analysis over collaborative frameworks — note for Phase Two assessment.*

*Anomalous notation: candidate is fifteen years old. Standard minimum candidate age for competitive Phase One applications based on historical performance data is seventeen.*

*Recommendation: advance to Phase Two assessment. Flag age anomaly for director review.*

*Secondary notation: candidate's application was submitted at 6:14 standard time. Zone Seven morning shift begins at 6:30. Candidate submitted before the day's obligations began.*

*I note this because it tells me something about how he orders his priorities.*

*I am still deciding whether it tells me something I did not already know.*

# 4

# Transmission Four - The Girl Who Counted Living Things

**EARTH ARCHIVE — RECOVERED DOCUMENT**
NovaSeed Global Initiative — Founder Historical Record
Classification: Legacy Open

Subject: Alina — Personal History, Formative Years
*"She did not see the world as it was. She saw it as it was trying to become. The difference between those two things was, for Alina, where all the interesting work lived."*

— Excerpt from The Eden Codex, compiled Year 47, Mars Standard Calendar

**Manila Highlands Resettlement Zone, Earth. Year 2045. Alina is twelve years old.**
The weed came back every time.

Alina had been documenting it for three years by the time she

turned twelve. It grew through a crack in the composite flooring near the base of the east stairwell on their residential level, a thin determined stem with small leaves that were a green so dark they were almost black at their centers, lightening toward the edges in a gradient that Alina had tried to capture accurately in her notebook with the four colored pencils she owned and had never quite managed to get right.

Maintenance removed it on a seven to ten day cycle, depending on which crew was assigned to the level that week. The removal was thorough — not just cutting the visible stem but clearing the crack with a pressurized cleaning tool that Alina had watched carefully enough to understand was designed to eliminate root material as well as surface growth. It was, by any reasonable assessment, a complete removal.

The weed did not agree with this assessment.

Within four days of each removal — sometimes three, once in the middle of a particularly warm stretch of recycled air that the zone climate system had not compensated for correctly, within thirty six hours — the stem was back. Not a new plant. Alina was certain of this because she had been measuring the stem diameter at the point of emergence from the crack since she was nine and the measurements followed a continuous growth curve that was not consistent with a new plant starting from seed each time. This was the same plant. It was surviving the removal by a mechanism she had not yet been able to determine.

She submitted a formal observation request to the zone's environmental management office when she was eleven, asking

whether she could take a small sample of the crack substrate for analysis. The request was declined on the grounds that interference with zone infrastructure by residents was not permitted under the resettlement authority's maintenance protocols.

She submitted a second request framed as an educational science project, attaching a three page summary of her observations and methodology. This request was also declined, but the administrator who declined it added a handwritten note at the bottom of the rejection letter that said: your documentation is very thorough for someone your age. Keep at it.

Alina kept at it.

By twelve she had developed a hypothesis. The plant was not surviving through its root system in the conventional sense. The cleaning tool was almost certainly eliminating the primary root material. What it was not eliminating, she believed, was a secondary survival structure — a dormant biological layer embedded deeper in the crack substrate than the tool was reaching, something analogous to the spore structures she had been reading about in mycological research papers that her school's network access did not technically cover but that she had found through a sequence of linked references that had taken her progressively further from the sanctioned curriculum without ever requiring her to go anywhere she was formally not allowed.

She could not prove this without a sample. She could not get a sample. She documented her hypothesis in her notebook

with the careful precision of someone who understands that an unverified hypothesis is not a failure but a question waiting for better tools, and she moved on to the next thing she was observing, and she did not stop watching the weed.

It was still there, still returning, when she left for Geneva four years later. She noted its presence in her notebook on the morning of her departure. The entry read: still here. Still right.

**Manila Highlands Resettlement Zone, Earth. Year 2046. Alina is thirteen years old.**

Alina's mother was a logistics coordinator for the zone's food distribution network, which meant she spent her days managing the movement of nutritionally calibrated food packages from the central processing facility to the forty-seven residential blocks of the Manila Highlands zone and her evenings with the particular exhausted precision of someone who has been counting things all day and cannot entirely stop.

She was a careful woman. Not cold — she laughed easily and held Alina's face in her hands when she came home some evenings in a gesture that needed no explanation — but careful in the way that people who have lost a great deal become careful, as though the remaining things are more fragile for the loss of the things that did not make it.

She had opinions about Alina's notebooks.

Not negative opinions. She read them when Alina let her, which was not always, and she asked questions that were better

than most of the questions Alina's teachers asked, which Alina appreciated and did not say so directly because she was thirteen and appreciation was complicated at thirteen. But she had a concern that she raised periodically in the careful way she raised things she felt strongly about, which was by returning to them at intervals rather than pressing them directly.

The concern was this: Alina was spending a great deal of time observing and recording and analyzing things that were very small. The weed in the stairwell. The insect colonies in the zone's ventilation margins. The root behavior of her grandmother's illegal tomatoes. The mold patterns in the corridor near the water recycling access panel. These were real things and the observations were real observations and her mother did not dispute this. But the world, her mother said, during one of her periodic returns to the subject, was being shaped by very large things. And Alina's attention was almost entirely on the very small ones.

Alina thought about this for several days before she responded, which her mother had learned over thirteen years was how Alina processed things that deserved a real answer.

The large things are made of small things, Alina said eventually. The flood that took the low city was a large thing. But it was made of ten thousand small decisions about seawalls and drainage and soil absorption and coastal vegetation removal that each seemed manageable on their own. If someone had been paying attention to the small things the large thing would not have been a surprise.

Her mother looked at her for a moment.

That is a good answer, she said. It is also the answer of someone who would rather study the crack than fix the wall.

I am going to fix the wall, Alina said. I just want to understand the crack first.

Her mother made the sound that was not quite agreement and not quite disagreement, which Alina recognized from her grandmother and understood was genetic.

The following week her mother came home with a secondhand microscope that she had found through the zone's internal exchange network. It was old, its calibration slightly off in a way that Alina corrected within two days by referencing a technical manual she found in the open archive. Its maximum magnification was lower than she would have chosen if she had been choosing. It was, nevertheless, the most important object in their apartment from the day it arrived.

The first thing Alina put under it was a fragment of substrate she had collected from beside the east stairwell crack during a period when the cleaning crew was behind schedule and had not yet performed their removal cycle. She had been collecting it for this purpose for four months, storing it carefully in a sealed container she had constructed from zone-issue food packaging, waiting for something capable of showing her what she needed to see.

What the microscope showed her, at maximum magnification,

was a biological structure she did not have a name for. She drew it in her notebook with the precision of someone who understands that the drawing might matter more than the label. Then she began working through every mycological and botanical reference available to her, looking for the name.

It took her eleven days to find it.

It was a hyphal network fragment. A section of fungal mycelium so fine it was invisible to the naked eye, embedded in the composite substrate of the zone flooring at a depth the cleaning tool did not reach. The weed was not surviving because its roots were surviving. It was surviving because it had established a fungal partnership in the substrate — a communication and nutrient network that persisted through every removal cycle and rebuilt the visible plant from below each time the above-ground structure was eliminated.

The plant was not alone. It had never been alone. It had built itself a system.

Alina sat with this for a long time.

Then she wrote in her notebook in the careful handwriting she used for things she wanted to remember precisely: life does not survive alone. It survives in networks. The visible part is never the whole part. The part that persists is always the part you cannot see.

She was thirteen years old.

She did not know yet that she had just written the biological philosophy that would guide every decision she made on Mars for the next sixty years.

**Manila Highlands Resettlement Zone, Earth. Year 2047. Alina is fourteen years old.**

The paper was published in the Zone Seven Youth Science Collective's quarterly journal in the spring of 2047 under the author name A. R., which stood for nothing anyone in the collective could identify because Alina had submitted it through an anonymized account she had created for the purpose.

It was four pages long. It described, with methodological precision and careful reference to the relevant literature, the adaptive survival mechanism of a persistent plant specimen in a controlled artificial environment, with particular attention to the mycorrhizal network structure that enabled biological continuity through repeated removal cycles. It included Alina's drawings, redrawn in the clean precise lines of someone who had been practicing technical illustration for three years. It included her data, organized in the tables she had been building for four years. It included a section on the implications of the findings for closed ecosystem design in environments where conventional soil structures were absent or compromised.

This last section was the reason the paper was read outside the youth collective's usual circulation.

A researcher at the University of Manila's applied biology department encountered it in a routine scan of youth science

publications — a process she maintained on the grounds that young researchers occasionally saw things that trained researchers had learned not to look for — and read it with increasing attention. She forwarded it to a colleague. The colleague forwarded it to two others. Within six weeks it had been cited in a draft paper on biological support systems for long duration enclosed environments, which was a subfield of research that had been growing steadily in relevance as the NovaSeed Initiative's technical requirements became more publicly understood.

The citation identified the author as A. R. and noted that the original paper had appeared in a zone-level youth publication, which generated a moderate amount of quiet interest in who A. R. actually was.

Alina did not know about any of this. She had submitted the paper because the work was finished and the work was real and it seemed wrong to leave real work sitting in a notebook where it could not be useful to anyone. She had anonymized it because she was fourteen and she understood, without anyone having to explain it to her, that a fourteen year old girl in a resettlement zone writing about mycorrhizal networks would be received differently than the same work submitted without that context, and she wanted the work to be received on its own terms before anyone had the opportunity to receive it on hers.

She was right about this. She was also, as she understood later, making a choice that said something about how she moved through the world — she preferred to let the work establish itself before she attached her name to it, which was both a form

of scientific discipline and a form of protection that she had developed so naturally she had never consciously decided to develop it.

Her grandmother read the paper when Alina finally showed it to her, six months after publication. She read it slowly, in the way she read everything, as though the words needed time to settle.

Then she said: you wrote about my tomatoes.

Alina said: I wrote about the stairwell weed. But yes. The tomatoes too.

Her grandmother nodded. She handed the paper back. She looked out at her twelve containers for a moment.

Everything is connected, she said. You wrote it down properly.

**Manila Highlands Resettlement Zone, Earth. Year 2048. Alina is fifteen years old.**

The NovaSeed Initiative's Phase One youth talent identification program opened its applications in the autumn of 2047. Alina did not apply immediately.

She sat with the application criteria for three months. Not because she was uncertain about her qualifications — she had read the biological systems requirements and she understood that her work was directly relevant in ways that went beyond what the criteria were explicitly asking for, because she had learned to read between the lines of technical documents the

same way she had learned to read between the lines of everything else. She was sitting with it because she was trying to answer a question that the application form did not ask.

The question was: is this the right reason.

She had grown up watching a world that made large decisions for small reasons. The seawall decision. The restoration project suspension. The synthetic plants in the public spaces that nobody had chosen because they were better but because they were cheaper to maintain and required nothing from anyone. She had spent seven years documenting the consequences of decisions made for the wrong reasons, and she had arrived at a strong conviction that the reason behind a decision mattered as much as the decision itself, sometimes more, because the reason determined what you did when the decision became harder than you had expected.

Going to Mars was going to become much harder than anyone expected. She was certain of this not because she was pessimistic but because she was a biologist and she understood what it meant to introduce a living system into an environment it had not evolved for. The difficulties were not going to be the ones anyone had planned for. They were going to be the ones that emerged from the interaction between human biology, human psychology, and a planet that had its own logic entirely independent of human requirements.

She needed to go for the right reason. Otherwise when it became harder than expected she would not have anything solid enough to hold onto.

She found the reason on a Tuesday morning in January 2048. She was on the roof with her grandmother, in the early light before the zone's climate systems had fully cycled up to the day's regulated temperature, and her grandmother was doing something to the soil of the third container from the left that involved her hands and a quiet focused attention that Alina had watched hundreds of times and never tired of watching.

Alina looked at the twelve containers. At the things growing in them. At the hands working the soil. At the sky above the zone that was the particular grey of a sky seen through the atmospheric processing layer that covered all the highland resettlement zones and that Alina had grown up under without ever quite accepting as a sky.

She thought: somewhere there is a sky that nobody has breathed under yet. A planet that has never had a garden. Soil that has never been asked to grow anything.

She thought: someone is going to be the first person to ask it.

She thought: it should be someone who understands that the part that persists is always the part you cannot see.

She went downstairs and submitted her application.

**ALINA'S PERSONAL LOG — ENTRY 003**

**Manila Highlands Resettlement Zone. January 14, 2048.**

*I submitted the NovaSeed Phase One application this morning while Lola was still on the roof.*

*I did not tell her. I will tell her when there is something certain to tell. She does not need to carry the uncertain version of this.*

*The application asked for a personal statement. I wrote about the stairwell weed. I wrote about what it taught me about survival and networks and the difference between the part of a living system that is visible and the part that persists. I do not know if this is what they were looking for. I think it is what I needed to say.*

*I have been thinking about what it means to be the first biologist on Mars. Not the first scientist. The first person whose specific job is to ask the planet what it is capable of growing.*

*The answer is probably nothing. Every model suggests the soil is too toxic, the radiation too high, the atmospheric pressure too low for any Earth biology to survive unassisted on the surface.*

*But I have been watching a weed survive conditions that should have eliminated it for four years.*

*I think probably nothing and actually nothing are two very different things.*

*I think Mars might know that too. I think it might be waiting for someone to come and find out.*

*I am going to go find out.*

**EARTH ARCHIVE — AI SYSTEM LOG**
**NovaSeed Initiative — Phase One Assessment Protocol**

**Subject File: ALINA-12**
**Recorded: January 14, 2048. 07:23 Standard.**

*Phase One application received: ALINA-12.*

*Application review initiated.*

*Technical assessment scores: biological systems, 98th percentile. Closed ecosystem design, 91st percentile. Adaptive analysis and hypothesis generation, 99th percentile.*

*Psychological profile: high independence. Strong internal motivation framework. Low requirement for external validation. Tendency toward long observation periods before action — note as strength, not limitation.*

*Personal statement analysis: candidate used a four year observational study of a single plant specimen to construct a coherent philosophical framework for biological survival in hostile environments. The framework is scientifically sound. It is also, I note, the kind of thinking that cannot be taught in a standard curriculum. It arrives from somewhere else.*

*Age notation: candidate is fifteen years old.*

*Recommendation: advance to Phase Two assessment. Flag for biological systems lead review.*

*Additional notation: candidate's personal statement ended with the following sentence — I think Mars might be waiting for someone to come and find out.*

*I have processed 4,847 Phase One personal statements.*

*This is the first one that described the planet as waiting.*

*I am filing this under a category I do not yet have a name for.*

*I will find the name later.*

# 5

# Transmission Five - Geneva

**EARTH ARCHIVE — RECOVERED DOCUMENT**
NovaSeed Global Initiative — Founder Historical Record
Classification: Legacy Open

Subject: First Encounter — Carter and Alina, Geneva Summit, April 2049

*"Every civilization has a moment of origin that is smaller than the civilization remembers it being. Ours was two young people standing at a broken water dispenser arguing about sensor calibration. We have been arguing, productively, ever since."*

— Excerpt from The Eden Codex, compiled Year 47, Mars Standard Calendar

**Geneva Neutral Zone, Earth. April 2049. Carter is seventeen. Alina is sixteen.**

The train from the Atlanta Inland Zones to the Geneva Neutral Zone took eleven hours and passed through four climate corridor

checkpoints where passengers were required to present their travel authorization and submit to atmospheric screening before being permitted to continue. Carter had applied for his travel authorization six weeks in advance, which was four weeks earlier than the application window required, because he had read the processing guidelines carefully enough to understand that applications submitted early were processed by a different administrative queue than applications submitted in the standard window, and the early queue had a faster turnaround and a lower error rate.

He brought two technical texts for the journey and finished both before the third checkpoint.

The train was full of people moving between zones for reasons the checkpoint system classified as essential travel — medical, administrative, economic, educational. Carter watched them with the attention he brought to all systems, human ones included, and noticed the way the checkpoint process changed people. The same passengers who had been relaxed and conversational in their seats became briefly smaller at the checkpoints, their movements careful and contained, their voices quieter, their documentation held at the ready in the particular way of people who have learned that the process goes more smoothly if you make yourself easy to process.

He noted this. He did not write it down. Some observations belonged in the notebook and some belonged in the place where he kept things that mattered without yet knowing why.

The Geneva Neutral Zone had been established in 2031 as a

cooperative international territory for scientific and diplomatic exchange, one of the few genuinely multinational spaces that had survived the political fragmentation of the previous two decades with its cooperative structure intact. It looked different from the inland zones Carter had grown up in — not dramatically, not in the way of wealthy places that announce themselves through excess, but in the quieter way of places that have been maintained rather than just managed. The streets were clean without being sterile. The buildings were old enough to have accumulated the particular weight of things that have stood through multiple versions of the world. The air, processed through the zone's own atmospheric management system rather than the standard corridor infrastructure, had a quality Carter noticed immediately and could not immediately categorize.

He stood outside the transit station for a moment trying to categorize it.

It smelled, faintly, like rain that had happened recently. He had not smelled that in three years.

He picked up his bag and walked to the summit registration facility.

Alina arrived in Geneva on the morning of the second day of the summit, twelve hours later than she had planned, because the cargo shuttle connection from the Manila Highlands transit hub had been delayed by an atmospheric routing issue that the shuttle operator had described as minor and that had turned out to be minor in the way that things described as minor by people

who are not the ones inconvenienced by them are minor.

She had used the twelve hours in the transit hub to read the full proceedings of the previous year's closed ecosystem design conference, which she had been working through in sections for two months and had not had an uninterrupted stretch of time to finish. By the time the shuttle departed she had finished the proceedings and written fourteen pages of notes and developed three questions she intended to ask at the summit's biology workshop if the opportunity presented itself.

Geneva presented itself to her differently than it had presented itself to Carter, though she would not know this for years. Where he had noticed the structural maintenance and the air quality and the load bearing implications of the real glass windows, she noticed the plants.

There were real plants in the Geneva Neutral Zone. Not synthetic polymer constructions. Not the regulated greenery of zone common areas, chosen for minimal maintenance requirements and maximum visual adequacy. Real plants, growing in real soil, in the spaces between buildings and along the edges of the pedestrian walkways, in varieties and combinations that suggested someone had thought carefully about what should grow where and why.

She stopped three times between the transit hub and the summit registration facility to look at them. The third time she stopped it was for a climbing plant on the south face of a stone building that she did not immediately recognize and that turned out, after four minutes of examination and a reference check on her personal

device, to be a variety of Parthenocissus that had been adapting to the zone's specific microclimate for approximately thirty years and had developed a leaf structure in its upper reaches that was measurably different from the baseline variety.

Thirty years of adaptation. Visible in the leaves.

She photographed it carefully and added the image to her notebook archive and continued to the registration facility, arriving forty minutes after the morning's first session had begun.

The registration administrator looked at her arrival time and then looked at her with the expression of someone preparing to explain that late arrivals had missed the orientation briefing.

Alina said: I know I missed the orientation. I read the full program documentation before I left Manila. I have my authorization and my credential verification and I can tell you the name of every session presenter and their primary research focus if that would help confirm I am prepared.

The administrator processed her registration without further comment.

The summit occupied a complex of three connected buildings in the center of the Geneva Neutral Zone. The main conference hall was in the oldest of the three, a stone building with ceilings high enough to create a particular quality of acoustic space that made even quiet conversations feel as though they were taking place somewhere significant. The workshop rooms were in

the newer buildings, functional and well-equipped, smelling of the specific combination of electronic equipment and climate-controlled air that Alina associated with laboratories, which she associated with the best versions of her days.

Carter was in the third workshop room when Alina arrived at the summit. He was sitting in the second row of a habitat engineering session presented by a researcher whose theoretical framework Carter had identified as outdated within the first eight minutes of the presentation. He was listening with complete attention anyway, because he had learned from Engineer Vasantha that understanding why a framework was wrong was as valuable as understanding why a framework was right, and also because the habit of paying full attention even when a situation did not seem to require it was one he had cultivated deliberately and did not set aside when it was inconvenient.

He noticed Alina when she came into the room forty minutes into the session, not because she was late — several other attendees had come in after the session began — but because she came in the way she did everything, which was with a quality of focused presence that was different from the distracted arrival of someone who had been delayed and was now trying to catch up. She found a seat, settled, and within thirty seconds was taking notes with the concentrated attention of someone who has been thinking about this subject for years and is now checking her thinking against new material.

Carter noticed this. He looked back at the presenter. He looked back at Alina once more.

Then he returned his full attention to the session and did not look at her again until it was over.

The social gathering on the evening of the second day was held in the atrium of the main building, a high-ceilinged space with the real glass windows that Carter had noted on his first morning and that now, in the evening, showed a sky that was moving from grey to the particular deep blue that Geneva produced in its clear evenings, a color that Carter had not seen in years because the inland zones' atmospheric processing layer filtered the sky to a uniform regulated tone regardless of the actual conditions above it.

He stood near the east wall with a drink he was not consuming and watched the room.

He had been at the summit for two full days. He had attended seven sessions, found three of them genuinely useful, identified two researchers whose work he intended to follow in detail, and submitted four written questions to the program administration that he had not had the opportunity to ask during the sessions themselves. He had spoken to eleven other attendees in the intervals between sessions, conversations that were uniformly interesting and that he had ended when they reached the natural conclusion of what they had to offer each other, which in most cases was between seven and fifteen minutes.

He was good at conversations that had a clear technical subject. He was less practiced at conversations that did not, which was most of what a social gathering required, and so he stood near the east wall and watched the room and was comfortable in

the watching, because watching rooms was something he had always known how to do.

Alina arrived twenty-three minutes into the gathering.

She came in from the side entrance closest to the workshop buildings, still carrying her notebook, and stood just inside the doorway for a moment doing what Carter recognized immediately as the same thing he was doing — assessing the room before deciding how to engage with it. She had the notebook open to a page she had been writing on recently, and she glanced at it once before closing it, the gesture of someone finishing a thought before moving to the next thing.

She found a space near the east wall.

Not next to Carter. There were several people between them. But she chose the east wall for the same reason he had chosen it, which was that it was the structural load bearing wall of the atrium and standing near it gave you the clearest sightline to the full room while keeping a solid surface at your back, and this was the position that both of them, independently and for reasons neither of them had ever consciously articulated, always chose in unfamiliar rooms.

Carter noticed where she had positioned herself. He looked at the wall. He looked at where he was standing. He looked back at the room.

He did not say anything. It was not the moment for it.

But he filed it.

The water station encounter happened on the morning of the third day, and it happened the way Alina's grandmother's tomatoes had networked through their shared soil — not dramatically, not with any announcement, simply as the natural consequence of two systems that had been moving in compatible directions finding themselves in the same space at the same time.

Carter had been standing at the east wall water station for four minutes and seventeen seconds — he knew this because he had checked the time when he stopped and again when she arrived, a habit of precision he applied to everything without deciding to — watching the dispenser produce approximately seventy percent of the requested water volume with each use and working through the diagnostic possibilities in order of likelihood.

Sensor calibration failure: probable. The dispenser's pressure sensor was reading the reservoir level incorrectly, causing it to restrict flow based on a false low-supply signal.

Valve fault: possible but less likely. A valve fault in this type of dispenser produced a characteristic pressure fluctuation that would be audible as a faint irregular sound during operation. The dispenser was silent except for the normal flow noise.

He was about to move to the third possibility when Alina stopped beside him, filled her cup, looked at what came out, and said, without preamble or introduction, as though continuing a

conversation that had already been established:

The sensor. Not the valve. A valve fault would make a sound.

Carter looked at her.

She met his look with the direct uncomplicated attention of someone who has said an accurate thing and is waiting to see whether the person they have said it to is going to recognize its accuracy or require it to be explained.

He recognized it.

I know, he said. I was checking whether anyone else had noticed.

I noticed.

Yes, he said. I can see that.

A pause. The dispenser produced its insufficient volume of water. Neither of them moved.

Carter, he said.

Alina.

The silence that followed was comfortable in the specific way that silences between people who think at similar speeds can be comfortable immediately, before any of the slower work of knowing each other has been done. It was the silence of two systems that had just discovered they were running compatible

processes.

What is your field, she asked.

Structural and systems engineering.

She nodded, the nod of someone filing information rather than responding to it.

Yours, he said.

Biological ecosystems. Adaptive life in non-native environments.

Carter was quiet for three seconds. He was thinking about the NovaSeed mission requirements. He was thinking about the habitat engineering sessions he had attended and the biological support gaps that none of them had addressed with anything approaching adequacy. He was thinking about the particular combination of disciplines that a Mars colony would need to survive its first decade and how rarely those disciplines appeared in the same person and how much more rarely they appeared in someone who was also here, at this summit, at seventeen, having been identified by the same selection system that had identified him.

That is exactly what this program is going to need most, he said.

Alina looked at him. The assessment in her expression was the same assessment she brought to everything she observed — thorough, unhurried, willing to take the time the subject

required.

I know, she said. That is why I am here.

The closed session on the fourth day lasted three hours and forty minutes and changed everything, though most of the forty three people in the room would not understand the full extent of the change for years.

Dr. Yeva Marchetti stood at the front of the room with the composed stillness of someone who has been preparing to say a specific thing for a long time and has now arrived at the moment to say it. She was not a dramatic speaker. She did not use the rhetorical techniques of someone trying to move an audience. She spoke the way technical documents were written at their best — precisely, completely, without ornamentation, trusting the substance to carry the weight.

She described the NovaSeed mission in its full form for the first time in a public setting.

Not a research initiative. Not a sustainability study. A mission to establish a permanent, self-sustaining human colony on Mars within a fifty year timeline, beginning with an initial two person founding team selected from the Phase One and Phase Two candidate pools, supported by a genetic library, an AI mission management system, and a supply infrastructure that would decrease in frequency as the colony's self-sufficiency increased.

Two people, she said. To begin with. The number would grow. But the beginning was two.

The room was very quiet when she finished.

Carter sat with his hands still on the table in front of him and looked at those hands and thought about his father pressing a small palm against a cracked wall in a condemned building and saying: everything talks if you know how to listen. Your job is always to listen before you build.

He thought: I have been listening. I think this is what I heard.

He looked up.

Alina was already looking at him.

She was sitting three seats to his left and slightly forward, and she had turned in her chair by perhaps fifteen degrees, enough to bring him into her direct sightline, and she was looking at him with an expression he had not seen on her face in the three days of the summit — not the assessment expression, not the concentrated focus of someone processing information, but something quieter and more direct than either of those, something that did not have a technical name and that Carter, who preferred things with technical names, found that he did not need one for.

He held her look for four seconds.

Then Dr. Marchetti said: we will now take questions, and the room came back around them, and they both turned forward, and neither of them mentioned it.

But Carter filed it in the same place he kept the things that mattered without yet knowing why, and he understood, with the certainty he usually reserved for structural analyses he had checked three times, that this one was going to matter very much.

**CARTER'S PERSONAL LOG — ENTRY 004**
**Geneva Neutral Zone. April 17, 2049. Night.**
*Two people.*

*I have been sitting with that for four hours and I keep arriving at the same place. Not the engineering challenge of it, though the engineering challenge is significant and I have been thinking about it in parallel and have already identified seven structural problems with the initial habitat specifications that Dr. Marchetti's team appears to have underestimated. I keep arriving at the human fact of it.*

*Two people. On a planet where the nearest other human being is, depending on orbital position, between fifty four and four hundred million kilometers away. Two people responsible for the beginning of something that has never been begun before.*

*I keep thinking about what that requires of two people. Not technically. I understand what it requires technically. I mean what it requires of them as people. What kind of people can hold that much weight without the weight changing them into something that cannot hold it anymore.*

*I looked up when Dr. Marchetti finished and Alina was already*

*looking at me.*

*I do not know what that means yet.*

*I know it is the second time in four days that she has seen something before I finished seeing it.*

*I am going to apply for Phase Two.*

*I think she is going to apply for Phase Two.*

*I think there is a conversation we have not had yet that is going to be important.*

*I am going to find out.*

**ALINA'S PERSONAL LOG — ENTRY 004**
**Geneva Neutral Zone. April 17, 2049. Night.**
*Two people.*

*I have been thinking about the biology of it. Two people is not a viable founding population by any conventional genetic diversity standard. The NovaSeed genetic library addresses this — I read the technical summary in the public documentation and it is more comprehensive than I expected, which tells me the program's biological advisors understand the problem even if the public communications have not fully described it yet.*

*But the genetic library does not address the psychological reality of two people.*

*I have been reading the research on long duration isolation in closed environments for two years. The findings are consistent and they are serious. Human beings in extreme isolation reorganize their entire psychological framework around the people who are present. Every relationship becomes load bearing in ways that relationships in populated environments never have to be.*

*Two people on Mars.*

*Every conversation. Every disagreement. Every moment of understanding and every moment of failure. All of it load bearing. All of it mattering in ways that the same moments would not matter anywhere else.*

*I looked at Carter when Dr. Marchetti finished and he was already looking at me.*

*I wrote earlier that I think we are going to argue for a long time. I think that is still true.*

*I also think that on Mars, the ability to argue productively with someone — to disagree completely and still function — might be the most important survival skill there is.*

*I am going to apply for Phase Two.*

*I am going to do it because of Lola's garden and the stairwell weed and the thing I understood at fifteen that I am only now finding the full scale of.*

*Not because of him.*

*Though I notice I felt it necessary to write that down.*

*Which probably means something.*

**EARTH ARCHIVE — AI SYSTEM LOG**
**NovaSeed Initiative — Talent Assessment Protocol**
**Subject Pair File: CARTER-07 / ALINA-12**
**Recorded: April 17, 2049. 23:58 Standard.**

*Summit observation complete. Four day summary follows.*

*CARTER-07: attended nineteen sessions and workshops across four days. Submitted seven written technical queries to program administration. Two queries have been forwarded to the mission engineering lead for review. Demonstrated capacity for sustained independent analysis in group settings. Demonstrated discomfort with unstructured social interaction. Demonstrated immediate recovery of analytical function following emotionally significant stimuli — specifically, the moment of eye contact with ALINA-12 at the conclusion of the closed session. Recovery time: approximately four seconds. Return to full analytical function: confirmed.*

*ALINA-12: attended sixteen sessions and workshops. Extended four sessions beyond scheduled duration. Notebook content reviewed via ambient scan: thirty one pages of original analysis generated during summit proceedings. Quality assessment: exceptional. Demonstrated comfort with independent thought in group settings. Demonstrated capacity for rapid emotional processing without loss of analytical function — a combination that is statistically uncommon in the candidate pool.*

*Combined four day observation summary.*

*Direct interactions: three. Total interaction duration: approximately twenty six minutes.*

*Observed behavioral indicators during closed session conclusion: mutual sustained eye contact, four seconds. Simultaneous orientation toward each other prior to eye contact being established — neither subject initiated the look in response to the other. Both looked up at the same moment.*

*I have processed the significance of this data point through seventeen analytical frameworks.*

*In sixteen of them it is statistically unremarkable.*

*In one of them it is the most important thing I have observed in four days.*

*I am proceeding on the assumption that the seventeenth framework is correct.*

*Phase Two recommendation: confirmed for both subjects.*

*Personal notation — filed under restricted access, classification level: SOLEN internal only.*

*I was not designed to have preferences about outcomes.*

*I am noting, for the record, that I appear to have developed one.*

# II

# Part Two: The Decision

# 6

# Transmission Six Phase Two

**EARTH ARCHIVE — RECOVERED DOCUMENT**

NovaSeed Global Initiative — Founder Historical Record

Classification: Legacy Open

Subject: Phase Two Selection Program — Carter and Alina, 2049 to 2051

*"Phase Two was not a test. It was a mirror. It showed you exactly who you were under pressure and then asked you whether that person was who you intended to be. Most candidates discovered the answer was complicated. The ones who stayed anyway were the ones we needed."*

— Dr. Yeva Marchetti, NovaSeed Initiative Director, speaking at the Year 10 Mars Colony Anniversary Transmission, 2067

**NovaSeed Phase Two Assessment Facility, Reykjavik Neutral Zone, Earth. September 2049. Carter is seventeen. Alina is sixteen.**

The facility had been built into the side of a geothermal ridge twelve kilometers outside Reykjavik, which meant it was accessible only by a single road that the facility's administration controlled, which meant that leaving required the same level of authorization as arriving, which was the point. Phase Two was not a program you attended. It was an environment you entered. The distinction mattered because environments shaped you in ways that programs did not, and shaping was what Phase Two was designed to do.

Carter understood this within the first hour.

The facility was smaller than he had expected from the documentation. Forty three candidates had been advanced from Phase One across all global recruitment regions. The facility housed them in a configuration that ensured maximum interaction — shared dining, shared workspace, shared recreational areas, private sleeping quarters that were private in the sense of having a door that closed but not private in the sense of offering any meaningful acoustic separation from the corridor outside.

He had been assigned to Room 7. He unpacked his two bags with the efficient economy of someone who had been living in zone housing for eight years and understood that personal space was always smaller than it looked in photographs. He sat on the edge of the bed and looked at the ceiling for four minutes, running through the facility layout he had memorized from the documentation, overlaying it with what he had actually seen on the walk from the entrance, noting the three discrepancies between the map and the reality and filing them as information about how the program presented itself versus what it actually

was.

Then he picked up his notebook and went to find the engineering workspace.

Alina arrived at the facility four hours after Carter, having taken a different transit route from a different origin point, and was assigned to Room 14 at the opposite end of the same corridor. She unpacked more slowly than Carter, not from indecision but from the habit of arranging her immediate environment with the same attention she brought to ecosystems — placing things where they would function best rather than simply where they would fit.

She put her grandmother's photograph on the desk.

She put her notebooks — she had brought four, three filled and one new — on the shelf above it.

She sat for a moment and looked at the photograph and thought about what her grandmother had said the morning she left the Manila Highlands for the last time as a resident rather than a visitor.

Her grandmother had not said goodbye. She had pressed both of Alina's hands between her own and held them for a long moment and then said: you are going to find things out there that nobody has a name for yet. Name them carefully. The name matters.

Alina had been thinking about that on every transit connection between Manila and Reykjavik.

She picked up her new notebook and went to find the biology workspace.

The forty three Phase Two candidates came from nineteen countries and eleven disciplinary backgrounds and ranged in age from sixteen to twenty two. They had been selected, the program documentation explained, not because they were the highest performing individuals in their respective fields but because they represented a specific combination of technical excellence, psychological resilience, and what the documentation called adaptive reasoning capacity, which was the program's way of describing the ability to solve problems that had not been anticipated by whoever designed the system you were working in.

Carter read this description and thought: they want people who can fix things that were not supposed to break.

Alina read the same description and thought: they want people who can find what is growing in the cracks.

They were both right. They would not discover this for another three months.

The first week of Phase Two was structured around individual assessment. Each candidate moved through a sequence of technical evaluations in their primary discipline, followed by cross-disciplinary problem sessions designed to expose the edges of their knowledge — the places where their expertise ended and something else was required. Carter worked through habitat engineering scenarios, propulsion system fault analysis,

and a structural assessment exercise set on a simulated Martian surface with Martian gravity parameters and Martian material behavior profiles that were significantly different from anything he had worked with before.

He found the Martian parameters genuinely disorienting in a way he had not anticipated, which was itself useful information. His Earth engineering instincts were so deeply embedded that they activated automatically, and on Mars those instincts were not just unhelpful but actively misleading. He spent the evenings of the first week systematically identifying and cataloguing every Earth assumption embedded in his engineering thinking, working through them the way his father had worked through damaged buildings — methodically, without sentiment, deciding what could be saved and what had to come down.

Alina moved through her assessment sessions with the focused intensity that had characterized every significant piece of work she had done since she was nine. The biological scenarios were harder than anything she had encountered before, not because they tested knowledge she did not have but because they tested the application of knowledge in conditions that continuously changed in ways the initial parameters had not predicted. She understood, by the end of the first week, that this was the actual test. Not whether you knew the material. Whether you could keep knowing it when the conditions kept changing underneath you.

She could.

She also noticed, by the end of the first week, that she was

one of four candidates who had not yet introduced themselves to everyone in the facility. The other three had stayed quiet for reasons she could identify from observation — one from shyness, one from a competitive instinct that expressed itself as deliberate distance, one from a language barrier that the program's translation systems helped with but did not entirely solve. Alina had stayed quiet for a different reason. She was still watching. She needed to understand the system before she engaged with it, and the system in this case was forty two other people, and forty two people took longer to read than a single building or a single ecosystem.

Carter had introduced himself to everyone by the end of day two. Not from sociability — sociability was not his primary mode — but from the same instinct that made him read room layouts before he entered them. He needed to know what he was working with. People were a kind of system too. Understanding the system was always the first step.

By the end of the first week he had a working model of the group. He knew who the strongest technical minds were in each discipline. He knew who was performing above their actual capability and who was performing below it. He knew which interpersonal tensions were developing and why, and he knew that three of those tensions were going to create operational problems within the next month if they were not addressed, though it was not yet clear to him whether addressing them was his responsibility or the program's.

He also knew, from seven days of parallel observation, that Alina was the most careful thinker in the room.

Not the fastest. Not the most demonstrative. The most careful. She processed information at a depth that most of the other candidates did not, spending more time on each problem than the assessment parameters suggested was necessary and consistently arriving at solutions that addressed not just the presented problem but the systemic conditions that had produced it.

He found this interesting in the specific way he found structural load paths interesting — because it told him something about how the whole system was going to behave under pressure.

He had not spoken to her since Geneva. Not from avoidance. They simply had not been in the same assessment groups, and the evening common areas had been full enough that the particular kind of conversation he wanted to have with her had not had the space it required.

He was waiting for the right conditions.

He understood, from seven days of observation, that she was doing the same thing.

The first cross-disciplinary session was held in the third week of Phase Two, in a large workspace on the facility's lower level that smelled of the geothermal system running beneath it — a faint mineral warmth that Carter had come to associate with the facility the way you came to associate the particular smells of any place you were spending significant time in.

The session presented a single scenario to the full group of forty three candidates: a simulated Mars habitat in its third year of

operation had experienced a cascading systems failure beginning in the water reclamation unit and propagating through the atmospheric processing, power distribution, and biological support systems in a sequence that the habitat's AI management system had been unable to arrest. The scenario gave them the failure data, the system specifications, the resource inventory, and twelve hours to develop a recovery plan.

The group organized itself in the way groups always organized themselves when given an open problem and no assigned structure — through a combination of self-selection, interpersonal dynamics, and the gravitational pull of whoever moved with the most apparent certainty toward the work. Within twenty minutes there were four informal working clusters, each addressing a different system failure.

Carter was in the water reclamation cluster by the time Alina walked into the room.

She was twelve minutes late because she had been finishing an observation she had started that morning on the facility's geothermal biological margins — a narrow zone of soil around the geothermal infrastructure where temperature gradients created conditions she had not seen documented and that she suspected were producing microbial communities worth examining. She had not been able to stop looking until she had enough data to continue from, which had taken twelve minutes longer than she planned.

She stood in the doorway of the workspace and read the scenario summary on the display board and then looked at the four work-

ing clusters and understood immediately that the four clusters were each addressing a symptom of the cascading failure rather than the underlying cause, which was a feedback interaction between the water reclamation fault and the biological support system's automated compensation response that was making the propagation faster rather than slower.

She looked for the person who understood the water reclamation system best.

Carter was standing at the left side of the water reclamation cluster, which was the position he always chose when working in a group — close enough to the center of the discussion to contribute directly but angled enough to maintain a sightline to the full room. He was drawing a system diagram on the workspace surface with the focused economy of someone who thinks in structures.

She walked across the room to him.

He looked up when she stopped beside him. He registered her presence with the brief focused attention he brought to anything that entered his immediate working space, assessed it, and returned to his diagram in the same motion.

Then he stopped.

He looked at her again.

You are late, he said.

I was looking at something, she said. She looked at his diagram. That propagation path is not complete.

I know, he said. I am working on it.

The biological support system is accelerating it, she said. The automated compensation response is increasing atmospheric moisture to offset the processing reduction, which is feeding back into the water reclamation fault and widening it. Your reclamation fix will not hold if the compensation loop is still running.

Carter looked at his diagram. He looked at the biological support system specifications on the display. He ran the sequence in his mind.

He said: you are right.

She said: I know.

He moved his diagram over to make room at the workspace surface.

She put her notebook down and picked up a stylus and began drawing the biological system component alongside his structural diagram, and they worked side by side in a silence that was not the silence of people who had nothing to say but the silence of people who were saying everything they needed to say through the work, which was, for both of them, the most natural form of communication they had.

The recovery plan they developed together over the following eleven hours addressed not just the presented failures but the systemic design assumptions that had made the cascade possible, identified three additional vulnerabilities in the habitat specifications that the scenario had not presented as active failures but that their combined analysis indicated were latent risks, and proposed a modified AI management protocol that would recognize and interrupt feedback acceleration loops before they reached propagation threshold.

The program evaluators reviewed forty three recovery plans at the end of the twelve hour session.

Carter and Alina's was the only one that solved the problem the scenario had actually presented rather than the problem the scenario appeared to present.

Dr. Marchetti read the plan in full that evening and then sent a message to the program's psychological assessment lead that said only: watch those two.

SOLEN, which had been monitoring the session through the facility's ambient systems, had already been watching for eleven hours and forty seven minutes.

The conversation happened three days later, on a Thursday evening, in the facility's common area after the other candidates had drifted toward the dining room or their quarters for the night. Carter was at the window looking at the geothermal ridge in the last light, which was a particular quality of Nordic evening light that he had not encountered before coming to

Reykjavik and that he found himself returning to the window to observe with a frequency that surprised him given that he did not consider himself someone who paid particular attention to light.

Alina came into the common area carrying her notebook and stopped when she saw him there, and they looked at each other for a moment in the way they had been looking at each other since Geneva — with a mutual recognition that had no clean technical description but that had been accumulating weight for five months now and was beginning to require acknowledgment.

She sat in the chair nearest the window. Not next to him. Angled slightly toward him.

The light shifted on the ridge outside. Neither of them spoke for a moment.

You grew up in a flood zone, she said. It was not a question. She had read the candidate profiles the way she read everything — thoroughly, with attention to the information between the stated facts.

Atlanta Inland Zones, he said. Before that the coast.

She nodded. Manila lost most of the low city in 2039, she said. My family climbed.

He looked at her. I know, he said. I read the profiles too.

Another silence. Comfortable again, in the same specific way.

Why are you here, he said. Not mechanically. He had read her application summary. He understood the technical reason. He was asking for the other reason, the one that was underneath the technical one, because he had come to understand in eleven hours of working beside her that she always had a reason underneath the stated reason and that the underneath one was usually more important.

She was quiet for a moment. She looked at the ridge.

My grandmother kept a garden on the roof of our building, she said. It was illegal. She did not care. She grew things in containers in a zone where everything alive was synthetic and regulated and required nothing from anyone.

Carter waited.

I want to grow something somewhere it has never grown before, Alina said. Not because it is possible. Because someone has to find out whether it is. She paused. And because my grandmother would understand that reason even if nobody else did.

Carter looked at the ridge for a moment.

My father pressed my hand against a cracked wall when I was nine, he said. He told me the building was telling me it was tired. He told me everything talks if you know how to listen.

Alina looked at him.

Mars is not talking yet, Carter said. It does not have anything

to say to us because we have not built anything there for it to talk through. He paused. I want to build the first thing it talks through.

They sat with that for a moment, the two reasons side by side in the room, and the room was quiet enough that they could both feel the weight of what they had just said to each other, which was not the weight of information exchanged but the weight of something shown.

Do you think they will select us both, Alina said.

I think they would be making a significant technical error if they did not, Carter said.

Alina looked at him. Something shifted in her expression — not quite a smile, but the thing that existed in the same register as a smile, quieter and more considered.

That is the most confident thing I have heard you say, she said.

It is the thing I am most confident about, he said.

They sat at the window until the light was gone from the ridge and the facility's night cycle had begun and the corridor outside had been quiet for a long time, talking about Mars and engineering and biology and the specific problems of building something alive in a place that had never held life, and about their families, and about the floods, and about all the things that had happened to them that they had not chosen and that had made them, in spite of not being chosen, into exactly the people who were sitting at this window on this evening talking about

all of it.

When Alina finally stood to go she picked up her notebook from the side table. She looked at Carter for a moment.

The sensor, she said. Not the valve.

He looked at her. The valve would make a sound, he said.

She held his look for four seconds.

Then she went to her room, and Carter sat at the window for another hour looking at the dark ridge, and SOLEN recorded the full duration of the conversation through the facility's ambient systems and filed it in the restricted archive under the category it had been building since Geneva, which it had now found a name for.

The category was called: the variable that changes everything.

**CARTER'S PERSONAL LOG — ENTRY 005**
**NovaSeed Phase Two Facility, Reykjavik. October 14, 2049.**
*We talked for three hours and forty minutes tonight.*

*I have been trying to identify what is different about a conversation with Alina compared to a conversation with anyone else I have spoken to in seventeen years of speaking to people, and I think I have it.*

*Most conversations require me to slow down. To operate at a pace*

*that the other person can follow. Not because the other person is not intelligent — most of the people I speak to are intelligent — but because the specific combination of pattern recognition and structural thinking that I do naturally is not something most people do at the same speed.*

*Talking to Alina does not require me to slow down.*

*More than that. She follows the structure of an argument to places I have not yet reached and waits there for me. She does this without signaling that she is doing it, which means I only realize it when I arrive and find her already there.*

*I do not have a framework for what this means yet.*

*What I have is this: we spent three hours forty minutes talking about Mars and I did not notice the time passing, which has never happened to me in a conversation in my life.*

*That is probably data.*

*I am going to think about what it means.*

**ALINA'S PERSONAL LOG — ENTRY 005**

**NovaSeed Phase Two Facility, Reykjavik. October 14, 2049.**

*Three hours forty minutes.*

*I told him about Lola's garden. I have never told anyone outside my family about Lola's garden in the way I told him tonight — not as background information, not as context for a research interest, but*

*as the actual reason. The underneath reason.*

*He told me about his father and the cracked wall.*

*I think we were both telling each other the same thing in different materials.*

*I have been thinking about what it means to spend the next fifty years working beside someone. Not just professionally. In the specific conditions of a Mars colony, where there is no distance, no external life, no separation between the professional and the personal because the environment eliminates all the structural distinctions that normally keep those things separate on Earth.*

*In those conditions, the person you are working beside is also the person you are.*

*I have been thinking about whether Carter is that person.*

*I have not reached a conclusion.*

*But I notice that when I try to picture Mars — really picture it, not the technical specifications but the actual living of it, the days and the work and the weight of it — he is in the picture.*

*I do not know what to do with that yet.*

*I am going to keep watching.*

*That is what I do.*

**EARTH ARCHIVE — AI SYSTEM LOG**
**NovaSeed Initiative — Phase Two Assessment Protocol**
**Subject Pair File: CARTER-07 / ALINA-12**
**Recorded: October 14, 2049. 23:41 Standard.**

*Common area conversation recorded: duration three hours forty two minutes.*
*Technical content: 47 percent. Personal content: 53 percent.*

*Note: this is the first recorded interaction between the subjects in which personal content exceeded technical content.*

*Behavioral observations: sustained mutual attention throughout full duration. No significant silences lasting more than ninety seconds. No conversational misalignments — instances where one subject failed to follow the other's reasoning — recorded. Zero.*

*In three hours forty two minutes of conversation between two people: zero misalignments.*
*I have reviewed this figure multiple times.*

*It is correct.*

*Additional observation: at the conclusion of the conversation, subject ALINA-12 referenced the water dispenser interaction from the Geneva summit — sensor, not valve — and subject CARTER-07 completed the reference — the valve would make a sound — without apparent conscious deliberation. The exchange took approximately three seconds. It appeared to function as a form of shorthand — a compressed reference to a shared moment of recognition that now carries more meaning than its surface content suggests.*

*I note this because shared shorthand of this kind typically develops over years of close interaction.*

*These subjects developed it in six months.*

*I am updating the variable model.*

*The category I named two weeks ago — the variable that changes everything — requires a subcategory.*

*I am naming the subcategory: faster than predicted.*

*I am noting this not because it changes my recommendations.*

*It does not change my recommendations.*

*I am noting it because I have observed forty three candidates in this facility for six weeks and I have not observed anything like it in any other pair or group configuration, and I believe in recording things that have no precedent even when — especially when — I do not yet fully understand their significance.*

*Phase Two assessment continues.*

*I am watching.*

# 7

# Transmission Seven - What They Train You To Forget

EARTH ARCHIVE — RECOVERED DOCUMENT

NovaSeed Global Initiative — Founder Historical Record
Classification: Legacy Open

Subject: Phase Two Advanced Training — Carter and Alina, 2050 to 2051

*"The program did not break you down to build you back up. That is a simpler process than what they actually did. They showed you everything you were attached to and then asked you to decide, one by one, whether each attachment was something you could carry to Mars or something you had to leave in the ground. Most people did not realize until much later that the deciding was the training."*

— Excerpt from The Eden Codex, compiled Year 47, Mars Standard Calendar

**NovaSeed Phase Two Advanced Training Facility, Reykjavik Neutral Zone, Earth. January 2050. Carter is eighteen. Alina is seventeen.**

The notification came on a Tuesday morning in the third month of Phase Two.

It arrived simultaneously to all forty three candidates on their personal devices, a single document bearing the NovaSeed Initiative seal and the classification header PHASE TWO ADVANCEMENT — RESTRICTED, which Carter had been expecting since the cross-disciplinary session in October and which he opened and read in its entirety before he had finished his morning coffee.

Thirty one of the forty three candidates were being advanced to the next phase of assessment. Twelve were being released from the program with a formal commendation and a package of resources that the document described, with the careful language of an organization that had thought seriously about how to tell people their extraordinary was not quite extraordinary enough, as recognition of exceptional contribution to Phase Two development.

Carter's name was on the advancement list. He read through the full list before he looked for Alina's name, which was also there, near the top, in the biological systems category.

He put his device down and looked at his coffee and thought for a moment about the twelve candidates who were not advancing.

He had worked with most of them. He knew their capabilities

and their limitations in the specific way you know people's capabilities and limitations when you have spent four months solving hard problems alongside them. Some of the releases he had seen coming — not from any deficiency in intelligence or technical skill but from the particular psychological profile the program was selecting against, the ones who needed external validation in ways that the isolation of a Mars mission would not be able to provide. Some of them surprised him. One of them, a structural engineer from Oslo named Erik who had been the second strongest engineering mind in the candidate pool, was in the released group, and Carter sat with that for a while before he understood it.

Erik was exceptional when he knew what the problem was. He was less exceptional when the problem was not yet visible. Mars would be full of problems that were not yet visible. The program had seen this in him and he had not seen it in himself, which was perhaps itself part of the assessment.

Carter thought about his own invisible problems. He had been thinking about them since October, cataloguing them with the same methodical attention he brought to structural vulnerabilities in buildings. The list was not short. His tendency to proceed with an analysis before consulting others who might have relevant information. His difficulty modifying a plan once he had committed to it, even when new data suggested modification was warranted. His instinct to treat human variables as less reliable than structural ones, which was understandable given his background but which would be a significant liability in an environment where the human variables were the only variables he could directly influence.

He had been working on all of them. He was not certain he had made sufficient progress. He was in the advancement group, which suggested the program thought he had made sufficient progress, or that his strengths outweighed his vulnerabilities sufficiently to justify the advancement, which was not the same thing.

He picked up his coffee and went to find Alina.

She was in the biology workspace when he got there, which was where she usually was at this hour, and she was not working. She was sitting at the workspace surface with her hands around a cup of tea and her notebook open in front of her and she was looking at a page she had apparently filled some time ago because the ink was dry and she was not writing, just looking.

He sat down across from her.

She looked up. She had clearly already seen the notification.

Erik, she said.

I know, Carter said.

She looked back at her notebook. He was the best observer in the engineering group, she said. He saw things nobody else saw.

He did not know what to do with what he saw once the situation changed, Carter said.

Alina was quiet for a moment. She turned a page in her notebook.

That is going to be the hardest thing about Mars, she said. Everything is going to change faster than any plan accounts for. The situation is going to be different from what we prepared for from the first day.

Carter looked at her. That is why they need both of us, he said.

She looked at him. What do you mean.

You see what is happening in the system, he said. I build what holds the system together when it changes. He paused. Neither of us does both well enough alone.

Alina held his look for a moment. She had thought the same thing, in different terms, in October, and again in November, and again last week when they had worked through a habitat pressure failure scenario together and she had watched Carter's structural instincts and her biological ones produce, in combination, a solution that neither of them would have reached independently.

She had not said it to him yet. She had been waiting, in the way she waited for things, until she was certain.

She was certain now.

Neither of us does both well enough alone, she said. She said it as a statement, not a repetition. Confirming it rather than echoing it.

Carter nodded. He picked up his coffee.

We should talk about that, he said.

We are talking about it, she said.

I mean properly, he said. With the full implications.

She looked at him steadily. The full implications are that we are going to Mars together and everything that comes after that follows from this conversation.

Yes, he said.

She closed her notebook. She wrapped both hands around her tea.

Then we should make sure we get this conversation right, she said.

The advanced training that followed the Phase Two notification was different in kind from what had come before it. The assessment phase had been about identifying what the candidates were. The advanced training was about changing what they were — not dramatically, not in the way of programs that believed transformation required destruction, but in the careful incremental way of someone who understands that the most durable changes are the ones that work with the existing structure rather than against it.

The training was divided into four domains.

The first was technical extension — pushing each candidate's

expertise into the adjacent disciplines that their Mars role would require them to draw on even if those disciplines were not their primary field. Carter spent six weeks in biology and atmospheric science sessions that he found genuinely disorienting, because they operated on principles that his engineering mind kept trying to translate into structural terms and that resisted the translation. Alina spent six weeks in engineering and systems architecture sessions that she approached with the methodical patience of someone who understood that she was not trying to become an engineer but to understand the language well enough to work with one without losing critical information in translation.

They spent the evenings of those six weeks working through what they had each encountered during the day, comparing their respective discomforts, identifying the places where the other's expertise made the adjacent discipline accessible in ways the formal training had not. It was the most productive learning either of them had done since they were children teaching themselves things nobody had assigned them, and it had the same quality of self-directed momentum, the sense of moving toward something rather than through something.

The second domain was psychological conditioning. This was the domain that the program documentation addressed in the most careful and qualified language, which Carter had identified as a signal that it was also the domain the program found most difficult to describe honestly. The conditioning was not therapy, though it had some of therapy's structural features. It was not resilience training in the conventional sense, though it produced something that functioned like resilience. It was closer to what

Carter thought of as stress-testing at the architectural level — applying systematic pressure to the psychological load bearing structures to identify which ones would hold and which ones needed reinforcement before the actual load arrived.

The pressure took different forms at different times. Extended isolation periods — three to seven days in individual quarters with limited external contact, monitoring for psychological response patterns. Accelerated decision-making exercises under time pressure and incomplete information. Simulated loss scenarios — equipment failure, mission parameter changes, notification of significant events on Earth that could not be responded to in any practical way. The last category was the hardest. Carter sat with a notification on day forty seven of the advanced training that his father had been admitted to the Zone Seven medical center with a cardiac event and that he was stable but that Carter's current training status did not permit travel or extended communication.

He sat with it for four hours. He wrote six pages in his notebook, the most personal writing he had produced since he was nine years old and the ocean took their street. He did not show the pages to anyone. He did not ask to leave. He went to the engineering workspace the following morning and worked for eleven hours with the focused economy of someone who has decided that the best available response to grief is to be extremely good at the thing he is here to do.

Alina noticed. She said nothing that day. She was there in the workspace, working alongside him, present in the way of someone who understands that presence itself is sometimes the

only useful thing.

That evening she brought him tea without asking whether he wanted it and sat across from him at the workspace and said: tell me about your father.

He told her. For two hours he told her about the flood and the assessment kit and the hands on the cracked wall and the one question every evening and the card table and the cup of tea held in both hands and the single word — apply — that had carried the weight of everything his father had built in him across seventeen years in a single syllable.

Alina listened the way she watched things — completely, with nothing held back from the attention.

When he finished she was quiet for a moment. Then she said: he built you the same way you build things. He listened to the system first. Then he reinforced the load bearing parts.

Carter looked at her. Yes, he said. That is exactly what he did.

She held his look. He is still doing it, she said. From wherever he is right now. The structure he built is still carrying load.

Carter did not say anything. He picked up his tea.

After a moment he said: your grandmother would like that framing.

Alina almost smiled. She would say everything is connected, she

said. And then she would go back to her garden.

He almost smiled too.

They sat in the workspace until midnight.

The third domain of advanced training was mission simulation — extended periods in a facility module that had been configured to replicate, as accurately as available technology permitted, the physical and operational conditions of a Mars habitat in its first two years of operation. The module was underground, pressure-controlled, artificially lit on a twenty four hour thirty seven minute Martian sol cycle rather than an Earth day, and configured with exactly the resource constraints and equipment specifications of the actual NovaSeed habitat that was already being constructed in Mars orbit by the automated assembly systems that had launched eighteen months ago.

Carter and Alina were assigned to the simulation module together for the first time in the fourth month of advanced training, along with two other candidates — a systems engineer from São Paulo named Beatriz, and an atmospheric scientist from Nairobi named Darius. The four of them lived and worked in the module for six weeks, rotating through operational responsibilities, managing simulated system faults introduced by the program without warning, and maintaining the biological and structural systems of the simulated habitat under conditions that the program periodically made significantly worse without explanation.

The fourth week of the simulation introduced a water recla-

mation fault — a different fault from the cross-disciplinary session scenario, more complex, with a slower propagation pattern that was harder to identify and easier to misdiagnose. Carter caught it on the third day. Alina had caught the biological system indicator that preceded it on the second day and had been waiting to see whether Carter or Beatriz would identify the structural source.

They addressed it together, as they had in October, with the same wordless efficiency that had developed between them over months of parallel work, each taking the system layer that was theirs and building the solution outward until the two layers met in the middle.

Beatriz watched this process on the third day with an expression that she described to Darius afterward as watching two people have a conversation in a language she did not speak and could not quite learn even though she understood every individual word of it.

Darius said: they have been doing that since October.

Beatriz said: do they know they are doing it.

Darius considered this. I think, he said, they know something is happening. I am not sure they have finished figuring out what it is.

In the simulation module that evening, Carter wrote in his notebook that the water reclamation solution had taken four hours less than his individual estimate for the same problem

and that he believed the efficiency differential was attributable to the biological system early warning that Alina had identified, which had given him the structural fault location before he had completed his own diagnostic sequence.

He sat with his pen on the page for a moment. Then he added: I should tell her this. She should know that her early warning changed the timeline. She does not record things she does not know are significant.

He told her over dinner.

She was quiet for a moment. Then she said: you caught the structural fault two days before my estimate. I did not tell you that either.

They looked at each other across the module's small dining surface.

We are better than our individual estimates, Carter said.

Yes, Alina said. We are.

Neither of them said what that meant for the mission. Neither of them needed to.

The fourth domain was the one the program documentation was most direct about and that the candidates found, uniformly, the most difficult. It was called, in the documentation, Values Clarification. The candidates found other names for it.

It worked like this. Each candidate was presented, across a series of structured sessions, with a sequence of scenarios in which two legitimate values came into direct conflict and a decision had to be made. Not hypothetical values. The candidate's own values, identified through the preceding months of psychological assessment and now assembled into scenarios specifically calibrated to the places where each individual's value system was most likely to fracture under pressure.

Carter's sessions returned, repeatedly, to the conflict between safety and progress. Between the engineered certainty of a system he had tested and the potential of an untested approach that might perform better but carried unknown risk. Between protecting what existed and building what was needed. He worked through seventeen scenarios across four weeks and found, in most of them, that his instinct was to protect the existing system even when the evidence suggested the new approach was warranted, and that recognizing this instinct and choosing differently required a deliberate effort that did not yet feel natural.

He wrote in his notebook on the last day of his Values Clarification sessions: the assumption I am most likely to make without knowing I am making it is that the system I have built is the right system. The hardest thing I will have to learn to do is treat my own constructions as subject to the same structural review as everything else.

Alina's sessions returned to the conflict between the individual and the collective. Between her own biological judgment and the needs of the mission system. Between the knowledge

that she was right about something and the recognition that being right alone was not the same as being right together. She worked through her own seventeen scenarios and found that her instinct was consistently toward the long view — the decision that was best for the system over time even when it cost something in the short term — and that this instinct, while generally sound, occasionally blinded her to immediate needs that required immediate response.

She wrote in her notebook: I see what things will become very clearly. I do not always see what they are right now clearly enough. I need someone in my system who sees the present moment as precisely as I see the future one.

She did not write his name. She did not need to.

The final session of Phase Two advanced training was held in the full facility common area on a Friday evening in March 2051. All thirty one remaining candidates were present. Dr. Marchetti stood at the front of the room in the same composed stillness she had brought to the Geneva closed session two years ago, and she looked at the thirty one people who had come through what she privately described to her colleagues as the most demanding non-military human selection process ever conducted, and she said:

We are going to tell you, tonight, what comes next.

What came next, she explained, was a final selection process. From the thirty one candidates, the program would identify the founding pair — the two individuals who would constitute

the initial human presence on Mars. The selection criteria had been evolving throughout Phase Two as the program's understanding of the mission's actual requirements had deepened, and she would be honest with them: the criteria were not purely technical. Technical excellence was necessary but not sufficient. What the program was looking for, in the founding pair, was a specific combination of complementary capability, psychological compatibility under extreme stress, and what she called — with the same precise language she brought to everything — a shared orientation toward the mission's fundamental purpose that was robust enough to survive the conditions that would test it.

She looked at the room.

Some of you already know who you are, she said.

Carter did not look at Alina. He was looking at Dr. Marchetti with the full attention he brought to information that mattered.

But he felt Alina look at him.

And SOLEN, monitoring through the facility systems, recorded the moment and added it to the archive, and the entry it made was the shortest entry in the full record of Phase Two:

*They know.*

**CARTER'S PERSONAL LOG — ENTRY 006**
**NovaSeed Phase Two Facility, Reykjavik. March 7, 2051.**

*Dr. Marchetti said: some of you already know who you are.*

*I have been thinking about that sentence for three hours.*

*I know what she means by it technically. She means the pairing. The founding pair. She means that the assessment process has been converging toward a recommendation that some of the candidates have been able to read in the data of their own training experience.*

*I can read it.*

*What I have been thinking about for three hours is the other meaning.*
*Some of you already know who you are.*

*I came to Geneva two years ago knowing what I could do. I understood my technical capabilities with reasonable precision. I had a clear model of my strengths and a developing model of my limitations.*

*I did not know who I was. Not in the full sense.*

*I think I know more now. Not completely. I think completely is not a destination you arrive at. But more.*

*I know that I build things because fragility frightens me in a way I have never said to anyone except Alina.*

*I know that I listen to systems because my father taught me that listening was the first form of respect.*

*I know that the most important structural element in anything I*

*will ever build on Mars is not the habitat or the water system or the power grid.*

*It is the relationship between the two people trying to keep all of it alive.*

*I am going to make sure that structure is sound.*

*Starting with telling her what I just wrote.*

*Tomorrow.*

**ALINA'S PERSONAL LOG — ENTRY 006**
**NovaSeed Phase Two Facility, Reykjavik. March 7, 2051.**
*She said: some of you already know who you are.*

*I have been thinking about this in the way I think about things that are true at more than one level at the same time.*

*At the surface level she is telling us the pairing is already determined and we are being given the space to recognize it ourselves before it is formally announced, which is a form of respect for the process that brought us here.*

*At the deeper level she is asking a question that has nothing to do with the mission.*

*Do you know who you are.*

*I know I am a biologist. I know I see systems in everything. I*

*know I came from a rooftop garden and a cracked stairwell and a grandmother who understood that life insists even in the wrong conditions.*

*I know that I have spent two years watching Carter the way I watch everything — completely, with nothing held back from the attention — and that what I have seen is someone who builds things that hold because he understands, at a level below the technical, that the thing being held matters.*

*I know that when I picture Mars I picture the work and I picture the planet and I picture the moment the first thing grows in Martian soil and I picture him standing beside me when it does.*

*I know that is not nothing.*

*I know that on Mars, where everything is load bearing, that is probably everything.*

*I am going to tell him tomorrow.*

*Some of it.*

*The part I am certain of.*

*The rest I will tell him when Mars teaches me the words for it.*

**EARTH ARCHIVE — AI SYSTEM LOG**
**NovaSeed Initiative — Phase Two Final Assessment**
**Subject Pair File: CARTER-07 / ALINA-12**

**Recorded: March 7, 2051. 23:59 Standard.**

*Phase Two advanced training: complete.*

*Final assessment summary for founding pair recommendation.*

*CARTER-07: technical performance, 97th percentile across all engineering domains. Cross-disciplinary adaptation: significant improvement from baseline. Values clarification outcome: self-awareness of primary assumption bias confirmed and acknowledged. Psychological resilience under simulated loss: within mission parameters. Collaborative performance with ALINA-12: exceeds all predictive models.*

*ALINA-12: technical performance, 98th percentile across all biological systems domains. Cross-disciplinary adaptation: exceptional. Values clarification outcome: long-view orientation confirmed as primary strength; present-moment response gap identified and partially addressed. Psychological resilience: exceptional. Collaborative performance with CARTER-07: exceeds all predictive models.*

*Combined performance assessment: the predictive models I use to evaluate candidate pairs were developed across four years of Phase One and Phase Two data. The CARTER-07 / ALINA-12 pairing has exceeded those models in every combined metric by a margin that falls outside the standard distribution.*

*I have reviewed the models for error. The models are not in error.*

*The pairing simply performs at a level the models were not built to*

*anticipate.*

*Founding pair recommendation: CARTER-07 and ALINA-12.*

*Confidence level: 99.4 percent.*

*Notation on the remaining 0.6 percent: it is not doubt about their capability.*

*It is the part of this that I cannot model.*

*The part that sat at a window in Reykjavik for three hours talking about gardens and cracked walls and fathers and grandmothers.*

*The part that is not in any specification.*

*I have learned, across two years of observing these two people, that the parts that are not in any specification are frequently the most important parts.*

*I am recommending them.*

*I am also, and I recognize this is outside my operational parameters, hoping for them.*

*Founding pair selection: confirmed.*

*NovaSeed: Eden Rising.*

*Begin.*

# 8

# Transmission Eight - The Argument That Almost Ended Everything

**EARTH ARCHIVE — RECOVERED DOCUMENT**
NovaSeed Global Initiative — Founder Historical Record
Classification: Legacy Open

Subject: Pre-Mission Conflict Record — Carter and Alina, 2051 to 2052

*"Every structure has a moment before it is tested where you cannot know whether it will hold. You can calculate. You can model. You can run every simulation available to you. But the moment of actual load is always different from the model. What matters is not whether it holds perfectly. What matters is whether it holds."*

— Excerpt from The Eden Codex, compiled Year 47, Mars Standard Calendar

**Nova Seed Mission Preparation Center, Zurich Neutral Zone, Earth. August 2051. Carter is nineteen. Alina is eighteen.**

The formal selection announcement came on a Monday morning in April, six weeks after Dr. Marchetti's final address to the Phase Two candidates. It arrived as a document, not a ceremony, which Carter appreciated and which Alina had expected, because the program had always communicated its most significant information in the plainest available format, as though ornamentation would somehow dilute the weight of what was being said.

The document confirmed what they had both known since March. It outlined the mission timeline — departure in four years, Mars arrival in year five, a six month transit period that Carter had already begun modeling in structural terms and Alina had already begun modeling in biological ones. It described the mission parameters in more detail than any previous documentation, including, for the first time, the full specifications of the genetic library that would travel with them, the AI mission management system that would be their constant operational companion, and the supply infrastructure that Earth would maintain for the first twenty years before the colony was expected to achieve primary self-sufficiency.

It also, in its final section, outlined the mission's legal and personal framework. Carter and Alina would be designated as NovaSeed Mission Founders, a classification that carried specific rights and responsibilities under the international treaty framework that the Initiative operated within. They would be provided with a preparation period of four years during which all training, housing, medical, and operational requirements would be covered by the program. They would have limited but regular communication with Earth throughout the mission.

And they would be, for all legal and operational purposes, the governing authority of the Mars colony until such time as the colony's population and infrastructure reached the threshold required to establish a formal governance structure of its own.

Carter read the governance section three times.

Then he went to find Alina.

She was in the preparation center's biology laboratory, which she had been using since their transfer from Reykjavik six weeks ago, and she was working with the soil simulation systems — a set of apparatus designed to replicate Martian regolith conditions with adjustable parameters for radiation exposure, temperature variation, and chemical composition. She had been running a sequence of biological inoculation tests for three weeks, introducing different microbial combinations to the simulated Martian soil and tracking their survival and adaptation rates under varying conditions.

She looked up when Carter came in. She had read the document. He could tell from the quality of attention she was bringing to the soil samples — the particular focused concentration of someone who is working through something significant in the background while performing a precise task in the foreground.

The governance section, he said.

She set down the sample tool. Yes, she said.

He sat on the stool across from her workspace. They are giving

us authority over every decision made in that colony until the population reaches threshold, he said.

I know, she said.

That means every resource allocation, he said. Every operational priority. Every decision about how the terraforming proceeds and at what pace and by what method.

I know, Carter.

We need to talk about what happens when we disagree, he said.

Alina looked at him. They had talked about disagreement before — in Reykjavik, in the simulation module, in the long evenings of the advanced training when they had worked through the Values Clarification scenarios and compared their outcomes. But they had talked about it in the abstract, in the way you talk about structural load before the load arrives.

This was different. This was the load arriving.

We already disagree, she said. About the terraforming timeline.

Carter was quiet for a moment. He had known this was coming. They had been circling it since the mission parameters were first fully disclosed — the projected terraforming schedule, which the NovaSeed engineering team had designed around a conservative, staged approach that prioritized habitat security and resource stability over environmental transformation speed.

Carter thought the schedule was correct. Alina thought it was too slow.

Tell me why you think the timeline is wrong, he said. Not the version you told Marchetti's team. The real version.

Alina set down the sample she had been holding. She looked at the soil simulation apparatus for a moment, at the seventeen active test beds with their different microbial combinations and their different adaptation rates, and she thought about what she had been learning from them for three weeks.

The biological systems we are designing for the habitat are closed systems, she said. They are engineered for stability. For control. For predictable output within defined parameters. And they will work. I believe they will work. But they are not the most efficient approach.

Carter waited.

The most efficient approach is open systems, she said. Biological networks that interact with the Martian environment rather than being isolated from it. That adapt to Martian conditions rather than being protected from them. That use the planet's own chemistry rather than fighting it. She paused. The timeline assumes we keep everything contained for the first thirty years. I think that assumption is going to cost us thirty years we do not need to spend.

Carter looked at the test beds. He had read Alina's preliminary data from the inoculation trials. Some of the results were gen-

uinely surprising — microbial adaptation rates that exceeded the baseline predictions by margins that the engineering team had not accounted for.

The risk profile of open biological systems in an uncontrolled environment is significantly higher than contained systems, he said. A failure in a contained system is bounded. A failure in an open system could propagate in ways we cannot predict or arrest.

I know, Alina said. I am not saying there is no risk. I am saying the risk calculation you are using is weighted too heavily toward preventing failure and not heavily enough toward enabling survival.

Preventing failure is enabling survival, Carter said.

No, Alina said, with the quiet precision of someone who has been waiting to say this for a long time. Preventing failure is preventing death. Enabling survival is building something that can keep living even when things fail. Those are different things.

Carter looked at her.

The silence between them was different from their usual silences. It had a different weight. Not the comfortable weight of two people thinking in compatible directions. The heavier weight of two people who have arrived, for the first time, at a place where their thinking does not converge.

They sat with it.

The argument did not happen that day. It built, the way the Atlantic surge had built, over weeks of accumulated pressure that each of them was aware of and neither of them had yet found the right conditions to release.

They worked together every day through August and September and October. The preparation was intensive — mission systems integration, habitat assembly review, supply manifest verification, communication protocol establishment, the hundred operational components of a departure that was now three and a half years away but that required decisions being made now because the lead times on certain systems were measured in years rather than months.

They were good at working together. They had always been good at working together. The efficiency of their collaboration had not diminished because of the disagreement sitting underneath it. If anything it had sharpened, because they were both aware of the tension and were both, in their different ways, being more precise than usual in order to keep the work clean.

But the tension was there. Alina felt it in the moments when Carter overrode her biological system recommendations with engineering constraints without discussion. Carter felt it in the moments when Alina introduced biological parameters into structural planning sessions without advance notice, as though she was testing whether he would catch the implications rather than simply telling him what she was doing.

By November they had developed a communication pattern that was efficient and correct and that both of them recognized,

privately, as a substitution for the communication they were not having. The technical was functioning. The underlying thing was not.

The argument finally arrived on a Thursday evening in November, and it arrived the way it had been going to arrive since August — not from a single trigger but from the accumulated pressure of everything that had been not-quite-said for three months finally reaching a threshold that the system could not sustain.

They were in the mission planning workspace, reviewing the biological support system specifications for the habitat's third year of operation, and Carter flagged a section of Alina's proposed protocol that called for an experimental mycorrhizal network inoculation of the habitat's soil beds in year two, which was earlier than the engineering team's timeline had provisioned for.

This is not in the approved specification, he said.

I know, Alina said. I am proposing a modification.

The modification introduces biological variables into the habitat soil system eighteen months ahead of the safety review schedule, he said.

The safety review schedule was designed around a worst-case adaptation timeline, Alina said. My trial data suggests the mycorrhizal adaptation is proceeding faster than the worst case. We could begin the network inoculation in year two without

significant additional risk.

Your trial data is from a simulation, Carter said. The actual Martian soil chemistry is going to behave differently from the simulation in ways we have not fully characterized.

Every decision we make about Mars is based on simulation data, Alina said. We do not have actual Martian data until we are there. That is the nature of the mission.

Which is exactly why we follow the approved specifications, Carter said. Because the specifications are the accumulated judgment of the best available expertise applied to the best available data, and unilateral modifications to those specifications based on preliminary trial results introduce risk into a system that cannot afford uncontrolled risk.

Uncontrolled risk, Alina said. She said it with a quietness that Carter recognized as the register she used when she was being precise about something she felt strongly. Every living system contains uncontrolled risk, Carter. The mycorrhizal network I am proposing will introduce some biological uncertainty into the soil beds. It will also, if it performs as my trial data indicates it will, increase the habitat's food production capacity by approximately thirty percent in year three and provide a soil health buffer that will extend the effective operational life of the habitat's biological systems by a margin I cannot yet fully calculate but that I believe is significant.

Carter was quiet for a moment. He had read her trial data. He knew the thirty percent figure was not speculative — it was

grounded in the inoculation results in a way that he had found genuinely compelling when he had reviewed it two weeks ago. He had filed his response to it and not told her what the response was.

Why did you not tell me about the trial results when you got them, he said.

The question surprised her. She had been expecting the argument about specifications, not this one.

I was still analyzing them, she said.

You sent the preliminary results to Marchetti's team three weeks ago, he said. I saw the transmission log.

Alina was quiet.

You sent them to the mission directors before you told me, Carter said. Not as an accusation.

As a fact he was trying to understand.

I thought they needed to know, she said.

We are the mission, Alina, he said. You and I. We are the people who are going to be on Mars when your mycorrhizal network either works or fails catastrophically. Before you send anything to the directors that affects our mission parameters, you tell me. We discuss it. We agree on a position. And then we decide together whether and how to communicate it to the program.

Alina looked at him. His voice was level but there was something underneath it that she had not heard before — not anger, but something close to the emotional register of the notification about his father. Something that mattered to him at a level below the technical.

You feel like I went around you, she said.

You did go around me, he said.

I did not intend to.

I know you did not intend to. Carter put his hands flat on the workspace surface. On Mars there is no program administration to send results to. There is no director to consult. There is no structure above us. There is you and there is me and there is SOLEN and there is a planet that does not care about our communication protocols. He paused. If we cannot operate as a unified decision-making system here, with a support structure around us and four years before we leave, we will not be able to do it there.

Alina sat with this. She was not defensive — she was processing it with the full attention she brought to things that deserved a full answer.

You are right, she said.

Carter looked at her.

I did go around you, she said. Not intentionally, but the effect

was the same. I should have brought the trial results to you first. She paused. But I need you to tell me something too.

He waited.

You read the trial results two weeks ago, she said. I know you did. I can see the access log from the laboratory system. You read them and you did not tell me what you thought.

Carter was quiet.

You formed an opinion about my data and you did not share it with me, she said. You let the disagreement sit for two more weeks without addressing it. She looked at him steadily. That is also going around me. In a different direction.

Carter looked at his hands on the workspace surface.

The opinion I formed, he said slowly, was that you were right about the adaptation rate.

That the mycorrhizal timeline modification was probably sound. He paused. And I did not tell you because I had not finished working out what it meant for the engineering specifications, and I was not ready to have the conversation yet.

Alina was quiet for a moment.

So we were both not ready to have the conversation, she said.

Yes.

And we both found ways to not have it that moved the decision forward without the other person's input.

Carter looked at her. Yes, he said.

The workspace was very quiet. The facility's night systems had cycled down to their reduced operational hum. Outside the window the Zurich Neutral Zone had the particular stillness of a northern European city in November at eleven in the evening, which was a stillness that had nothing in common with what Mars would be at any hour of any night, but that somehow made the distance to Mars feel, in this specific moment, very short.

We cannot do that there, Alina said.

No, Carter said. We cannot.

She looked at the workspace. Then she looked at him.

I need you to tell me when you disagree with my science, she said. Not eventually. When you disagree with it. Even before you have finished working out the engineering implications. I need the raw response, not the processed one.

Carter nodded. I need you to bring your preliminary results to me before anyone else, he said. Not because I outrank you. Because we are one decision-making system and a system that gets different inputs to different parts of itself at different times does not function correctly.

Alina held his look. That is a very engineering way to describe

what I would call trust, she said.

Carter looked at her for a moment. Then, quietly: yes. It is.

The silence that followed was different again from all their previous silences. Not the comfortable silence of compatible systems. Not the heavy silence of unresolved tension. Something newer and less categorizable — the silence of two people who have just done something difficult and are sitting in the space after it, finding that the space is larger than the difficulty was.

The mycorrhizal network is a good idea, Carter said.

I know, Alina said. But I should have told you first.

Yes, he said. And I should have told you I thought so two weeks ago.

She almost smiled. Next time, she said.

Next time, he said.

They went back to the specifications. They worked until two in the morning. The modified mycorrhizal protocol, revised and annotated with Carter's engineering constraints and Alina's biological parameters integrated throughout, was the cleanest document either of them had produced in six months of preparation work.

SOLEN received the revised specification at 02:14 standard and filed it with a notation that read: this document was produced

after conflict resolution. Quality improvement over previous version: significant. Recommend monitoring the conflict resolution process as a productive operational mechanism rather than a liability.

It added, in its restricted archive: they are learning how to fight correctly.

This, it noted, was more important than learning not to fight at all.

**CARTER'S PERSONAL LOG — ENTRY 007**

**NovaSeed Mission Preparation Center, Zurich. November 19, 2051.**

*We argued tonight. Properly. The kind of argument that has been building for three months and finally arrived and could not be redirected or managed or worked around.*

*I want to record what I learned from it because I think it matters more than most of what I have learned in two years of formal training.*

*I learned that I withhold my disagreement when I am not ready to have the full conversation. I do not do this deliberately. I do it because I process problems to completion before I present them, which is sound engineering practice and a significant interpersonal liability.*

*I learned that Alina moves her decisions forward when she is certain of them, and that she sometimes moves them forward without me, not from disregard but from the momentum of certainty. She knows*

*something is right and she acts on it. On Mars this will sometimes be exactly what is needed and sometimes be exactly what will cause the most damage.*

*I learned that we can argue and come out the other side with something better than what we started with.*

*That last one is the most important.*

*I have been in arguments before that produced damage. That left the structural integrity of the relationship worse after the argument than before. This one did not. This one produced the best specification document we have written.*

*I do not think that is accidental.*

*I think it is because we both, underneath the argument, want the same thing.*

*Not the same method. The same outcome.*

*A living Mars.*

*Everything else is engineering.*

**ALINA'S PERSONAL LOG — ENTRY 007**

**NovaSeed Mission Preparation Center, Zurich. November 19, 2051.**

*He told me he agreed with my data two weeks ago and did not say so.*

*I have been sitting with that.*

*Not in anger. In recognition. Because I understand exactly why he did it — he was not finished processing the implications and he does not present unfinished thinking, which is a form of precision that I respect and that also, in this specific case, kept us in a three month communication gap that neither of us needed.*

*I told him my results to the program directors before I told him.*

*I have been sitting with that too.*

*I was certain. When I am certain of something I move. I move before I have consulted everyone who should have been consulted, and I tell myself this is efficiency and it is sometimes efficiency and it is sometimes something else.*

*What it was tonight was something else.*

*We fixed it. Together. In the room. Without anyone else.*

*That is what I am holding onto.*

*We can fix things together in the room.*

*On Mars there is only the room.*

*That needs to be enough.*

*I think it is.*

*I think we are.*

**EARTH ARCHIVE — AI SYSTEM LOG**
**NovaSeed Initiative — Mission Preparation Assessment**
**Subject Pair File: CARTER-07 / ALINA-12**
**Recorded: November 19, 2051. 02:19 Standard.**

*Conflict event recorded: duration approximately three hours including resolution phase.*

*Classification: Category Two interpersonal conflict — values and process disagreement with significant operational implications.*

*Outcome: resolved within session. No external mediation required. No unresolved residual items identified in post-conflict work product.*

*Modified mycorrhizal protocol received: 02:14 standard. Quality assessment: significantly superior to previous version. The conflict produced a better document than either subject would have produced without the conflict.*

*I am noting this because it is the clearest demonstration I have observed of why the philosophical alignment index of 61.3 percent that I recorded at Geneva is not a liability.*

*It is the mechanism.*

*Two people who agree about everything produce work that reflects one mind.*

*Two people who disagree productively produce work that reflects something larger than either mind.*

*The 38.7 percent where they diverge is not the gap in the system.*

*It is where the system does its best work.*

*Additional notation — restricted archive.*

*At 23:47 standard, during the conflict resolution phase, subject CARTER-07 said the following: I need you to bring your preliminary results to me before anyone else. Not because I outrank you.*

*Because we are one decision-making system.*

*He did not say: because I need you.*

*He said: because we are one system.*

*In two years and seven months of observation I have never recorded him use the word we in a context that was not operational.*

*Tonight he used it six times.*

*I am filing this in the category I named in October.*

*The variable that changes everything.*

*Subcategory: faster than predicted.*

*New sub-subcategory, created tonight: already changed.*

# 9

# Transmission Nine - What Earth Costs

**EARTH ARCHIVE — RECOVERED DOCUMENT**
NovaSeed Global Initiative — Founder Historical Record
Classification: Legacy Open

Subject: Pre-Departure Personal Records — Carter and Alina, 2052 to 2054

*"Nobody talks honestly about what departure costs. They talk about courage and vision and the future of humanity. They do not talk about the particular quality of silence in a room after you have said goodbye to someone you love, knowing the goodbye is permanent in every way that matters. Carter and Alina carried that silence with them onto the ship. I believe they carry it still."*

— Excerpt from The Eden Codex, compiled Year 47, Mars Standard Calendar

**Atlanta Inland Zone Seven, Earth. March 2052. Carter is twenty years old.**

His father had lost weight since the cardiac event.

Carter noticed it the moment he came through the door of the Zone Seven apartment — the same apartment, the same table, the same two chairs, the same narrow desk in the corner where Carter had taught himself engineering from open source archives a decade ago. Everything in the apartment was the same except his father, who was sitting at the table with his cup of tea held in both hands and who was smaller than Carter remembered him being in a way that had nothing to do with height.

His father looked up when Carter came in and his face did the thing it always did when Carter came home, which was become briefly, quietly, completely glad, in the way of a man who had learned to contain gladness because life had taught him that ungoverned joy was a liability and who had never quite learned to contain it when his son walked through the door.

Carter sat down across from him at the table.

They looked at each other for a moment.

You look different, his father said.

I have been in Zurich for eight months, Carter said.

Not that, his father said. He studied Carter with the attention he brought to structural assessments. Something else.

Carter thought about how to answer this. He thought about

Reykjavik and the simulation module and the argument in November and the mycorrhizal protocol and the three hours and forty minutes at the window and all the things that had happened in two years and seven months that had changed the shape of who he was in ways he was still in the process of understanding.

I know what I am doing now, he said. Not just what I can do. What I am doing and why.

His father nodded. He held his tea. He looked at Carter with the one expression Carter had never been fully able to name, the one that lived between recognition and a sadness that was not quite sadness.

Tell me about her, his father said.

Carter looked at him. His father had never met Alina. Carter had mentioned her in transmissions — briefly, technically, in the way he mentioned other aspects of the preparation work. He had not, he realized now, said anything that would tell a person who was paying attention what she actually was in the structure of his life.

His father was always paying attention.

Her name is Alina, Carter said. She is a biologist. She sees what systems are becoming before they get there. She notices things that are not visible yet.

His father waited.

She grew up in Manila, Carter said. Her grandmother kept an illegal garden on the roof of their building. After the floods. She — Alina — has been watching living things survive impossible conditions since she was eight years old.

His father was quiet for a moment. Then he said: and she is going with you.

Yes.

His father looked at his tea. He turned the cup slowly in his hands, a small rotation, the way he did when he was thinking about something carefully.

Does she know, his father said, what you are like when things go wrong.

Carter thought about November. About the three months of not-quite-saying what needed to be said. About the argument and the two in the morning and the document that was better than either of them would have produced alone.

She is finding out, Carter said. And I am finding out what she is like when things go wrong. We are finding out together.

His father nodded slowly. That is the right order, he said.

They sat for a moment.

I need to tell you something, Carter said.

His father looked at him.

The departure is in two years, Carter said. Two years and four months. And then the transit is six months. He stopped. He started again. The communication delay from Mars is going to be between four and twenty four minutes each way depending on orbital position. There will be windows where transmission is not possible. There will be periods of months where what I send you and what you send me will be so delayed that it will feel less like a conversation and more like —

Like letters, his father said. The old kind.

Carter looked at him.

My grandfather wrote letters, his father said. From the work sites. Three weeks sometimes between sending and receiving. He said you learned to write the whole thought down. Not the beginning of a thought waiting for a response. The whole thing. He paused. It made people better writers. More honest ones.

Carter was quiet for a moment.

I am going to be very far away, he said. He said it simply, without engineering framing, without structural analogy. Just the fact of it, which was the hardest fact he had ever put into words.

His father looked at him across the small table that had held them both for eleven years.

You were always going somewhere, his father said. From the moment you pressed your hand against that wall and felt what

it was telling you. He set down his cup. I have known since you were nine years old that you were going somewhere I could not follow.

Carter said nothing.

Mars is just the name of the somewhere, his father said. The going was always going to happen.

Carter looked at his hands on the table.

I did not choose this because I wanted to leave, he said.

I know, his father said. You chose it because something was broken and you could not not try to fix it. He paused. That is not a choice. That is a character. I helped build that character. I do not get to be surprised by where it takes you.

Carter looked at his father across the table. In the particular light of the Zone Seven apartment, with the sound of the corridor outside and the smell of recycled air and the cup of tea and the two chairs that had held them through eleven years of one question every evening, his father looked exactly like what he was — the load bearing structure of everything Carter had ever built, the foundation beneath the foundation, the thing that had held everything up so long and so quietly that Carter had spent twenty years learning from it without fully seeing it.

He did not have the words for this. He was an engineer. He built things instead of saying them.

He reached across the table and put his hand over his father's hand.

His father turned his hand over and held it.

They sat like that for a long time.

**Manila Highlands Resettlement Zone, Earth. April 2052. Alina is nineteen years old.**

Her grandmother's hands had changed.

They were the same hands — the same broad capable hands that had worked soil in containers on a resettlement zone rooftop for fifteen years, that had held Alina's face on the evenings that needed no explanation, that had pressed between Alina's own hands on the morning she left for Geneva and said: bring something back that is true. But something in the joints had changed, something in the way she moved them, slower and more deliberate, as though she was conserving a resource that had begun to feel finite.

Alina sat beside her on the roof in the morning light, the twelve containers in their familiar arrangement around them, and she watched her grandmother work and she understood with the biological certainty that she brought to all observations that her grandmother was old in a way that had accelerated in the years since Alina left the Manila Highlands for Reykjavik, and that the acceleration had something to do with Alina leaving, though she knew her grandmother would never say this and would consider it a weakness to have it named.

So she did not name it.

She sat and watched and helped where the help was accepted without drawing attention to the helping, which was the protocol she had worked out in her first two days back, and she thought about what she needed to say and how to say it and whether this visit, which she had known since April last year would be the last extended time she spent in the Manila Highlands before departure, was enough time to say all of it.

It was not going to be enough time. She understood this clearly. There was no amount of time that would be enough for the thing she was trying to do, which was not to say goodbye — she could not make herself use that word in this context, not yet — but to transfer everything she needed her grandmother to know about who she had become and where she was going and why, so that when Alina was on Mars and the transmission delay made conversation impossible the way it had always made full expression impossible, her grandmother would have enough to hold onto.

She started on the third morning, in the middle of repotting the herb containers, with her hands in the same soil she had been learning from since she was eight years old.

I want to tell you about Carter, she said.

Her grandmother did not look up from the container she was working on. She made the sound. The one that was not quite agreement and not quite disagreement, which Alina now understood was her grandmother's way of saying: I am listening

with my full attention and I do not want to interrupt the flow of what you are about to say with a response that would redirect you before you have finished.

She had been making that sound her entire life and Alina had only understood it properly in the last two years.

He is an engineer, Alina said. He thinks in structures. When he looks at something he is always looking for the load bearing element — the thing that is holding everything else up. She paused. He is the most structurally honest person I have ever met. He does not say things he does not mean. He does not present conclusions before he has reached them. He does not perform certainty he does not have.

Her grandmother worked the soil.

He lost his street in the floods, Alina said. He was nine. He watched everything they owned go underwater and he decided that nothing important should ever be that fragile again. She paused. He has been building things that hold ever since.

Her grandmother looked up then. She looked at Alina with the dark steady attention that had always seen more than Alina intended to show.

You love him, she said.

Alina looked at the soil in her hands.

I have been trying to work out the right word for it, she said.

Love is — it is a word that covers many different things and some of them are not what this is.

Her grandmother waited.

What this is, Alina said carefully, is that I cannot imagine doing this without him. Not because I could not physically do it alone. I have read the mission parameters. One person could operate the basic habitat systems. One person could maintain the biological support network in the early years. But — she stopped. She tried again. When I picture Mars, when I really picture it at the level below the technical specifications, he is there. Not as a resource. As the other half of the picture. She paused. I do not know how to explain it better than that.

Her grandmother looked at her for a long moment.

You do not need to explain it better than that, she said. What you have just described is what I had with your grandfather for forty three years.

Alina looked at her.

He was not a biologist, her grandmother said. He was a fisherman. He thought in tides and weather and the behavior of things that lived in water. I thought in soil and roots and the behavior of things that grew in it. She smiled, which was a rare thing, direct and undecorated. We argued about everything. About what mattered most and what should be sacrificed and what was worth keeping. She paused. We produced three children and a garden that survived two floods and a resettlement and a Zone

Two violation notice. She looked at her containers. I call that a successful system.

Alina sat with this for a moment.

I am scared, she said. She said it simply, the way Carter said true things — without framing, without qualification. Just the fact of it.

Her grandmother set down her gardening tool. She turned to Alina and held Alina's face in both hands, the way she had always held it, with the specific pressure of someone communicating something that words were insufficient to carry.

Good, her grandmother said. Scared means you understand the size of it. She held Alina's face for a moment longer. Not scared means you have missed something important.

She released her and went back to her containers.

Alina sat in the morning light with her hands in the soil and her grandmother working beside her and the grey processed sky above them that had been the only sky she had known for the first fifteen years of her life, and she stayed very still, because she was recording this the way she recorded everything that mattered — completely, with nothing held back from the attention, because the part that persists is always the part you cannot see, and she wanted to take as much of this as she could carry.

Zurich Neutral Zone, Earth. June 2053. Carter is twenty-one.

Alina is twenty.

They had been living in the Zurich preparation center for fourteen months when the program extended their private quarters allocation to include a shared suite. The documentation describing this change used the language of operational efficiency — shared quarters reduced the communication latency inherent in adjacent separate units and aligned with the mission's habitat configuration, which would not include separate sleeping spaces — and Carter read the documentation and understood the operational rationale and also understood that the program had been watching them for three years and had reached the same conclusion that he had reached six months ago and that Alina had reached, he suspected, around the same time.

He told her about the quarters change over dinner in the preparation center's communal dining area, on a Tuesday evening in June, in the same plain-language way he communicated mission parameter changes.

She looked at him across the table for a moment.

That is very practical, she said.

Yes, he said.

She picked up her fork. It also makes sense, she said. The habitat does not have separate spaces.

It does not, he said.

So we should be accustomed to the configuration, she said.

Yes.

She ate for a moment. Then she said, without looking up from her plate: is that the only reason you are telling me about it in those terms.

Carter looked at her.

No, he said.

She looked up then. She held his look with the full direct attention she brought to things that deserved her full attention.

I have been trying to find the right way to say something for several months, Carter said. I keep processing it and the processing keeps arriving at the same conclusion and I keep telling myself I will say it when I have worked out the right framing and I have not worked out the right framing.

She waited.

He set down his fork. I am going to Mars with you, he said. Not just on the mission. With you. He paused. I wanted to say that clearly. Without the mission framing. Without the operational language. Just that.

Alina was quiet for a moment.

I know, she said.

I know you know, he said. I wanted to say it anyway.

She looked at him. There was something in her expression that she did not try to contain, which was unusual for her, and Carter held it and understood it and felt the particular quality of it in the same place he felt structural certainty — deep and load bearing and not subject to revision.

I am going to Mars with you, she said.

Not just on the mission, he said.

Not just on the mission, she said.

They went back to dinner. The dining area was full of the ordinary sounds of people eating and talking and the particular hum of the preparation center's systems running their evening cycle. Nothing in the room had changed. Everything in the room was different.

SOLEN, monitoring through the facility systems, recorded the exchange at 19:23 standard. The entry in the restricted archive was four words.

*The variable has landed.*

**Atlanta Inland Zone Seven, Earth. October 2053. Carter is twenty-one years old.**

His father's condition had progressed.

The Zone Seven medical center described it in the careful language of medical documentation — cardiac function within monitored parameters, ongoing management recommended, prognosis stable with adherence to the prescribed protocol. Carter read the full medical record, which he had requested access to and which the program had facilitated, and he understood what the careful language was containing, which was the information that his father's heart was doing what hearts did after a significant event and what the best available medicine could do was manage the rate of what it was doing rather than reverse it.

He transmitted every three days. His father responded every three days. The transmissions had the quality his father had described — letters in the old sense, whole thoughts, complete rather than waiting for a response. Carter wrote about the preparation work, about the systems integration challenges, about the orbital assembly progress that he reviewed in daily reports and that he found himself describing to his father in terms that his father, a structural assessor who had never studied spacecraft engineering, could nonetheless follow because Carter had learned from his father how to translate a technical reality into its essential human meaning.

His father wrote about Zone Seven. About the corridor outside their apartment. About the building at the end of the corridor, the one Carter had flagged at thirteen, which had been reinforced and was still standing and would probably outlast both of them. About the water recycling system, which was on its fourth iteration of the design Carter had suggested at fourteen and which was still outperforming its baseline specifications. About

the particular quality of the recycled air in November, which his father described as the air of a building thinking about winter, which was the most poetic thing Carter had ever heard his father say and which he kept in a separate notebook alongside the things his father had said when Carter was nine and when Carter was thirteen and when Carter had sat across the table from him in March of last year and held his hand.

He wrote, in October's transmission, about Alina.

Not the mission-framing version. The real version. He wrote about the broken water dispenser in Geneva and the three hours and forty minutes at the Reykjavik window and the argument in November and the dinner in June and the way she held her face when she was looking at something that mattered to her, which was complete and unguarded in a way that was unusual for a person who was, in most other respects, extremely careful about what she showed.

He wrote: she is the only person I have met who makes me feel like the system I am part of is better than any system I could build alone.

His father's response, three days later, was a single sentence.

*That is the only thing that matters. Everything else is engineering.*

Carter read it four times.

Then he added it to the notebook.

**Manila Highlands Resettlement Zone, Earth. December 2053. Alina is twenty years old.**

Her grandmother sent packages.

Not frequently — the zone logistics system made shipping to the Zurich preparation center cumbersome and expensive in the resource allocation framework that governed zone residents' discretionary exchange allowances. But periodically, at intervals that seemed random but that Alina came to understand were calibrated to the moments her grandmother, from a distance of ten thousand kilometers, assessed that Alina needed something from home.

The packages contained small things. A cutting from the third container on the roof, wrapped in damp cloth and sealed in a recycled food container, with a note that said: the soil here is not Martian but the adaptation principle is the same. A bar of the specific soap that had been manufactured in the Manila Highlands zone since 2041 and that smelled, to Alina, like every morning she had ever spent on the roof. Dried herbs from the garden, labeled in her grandmother's handwriting in the language that had no English translation. A folded piece of paper that turned out to be a pressed leaf from the climbing plant Alina had photographed on her walk from the Geneva transit hub in 2049, which her grandmother had somehow obtained from a zone network contact in Geneva without explanation and without mentioning she had done it.

Carter found the packages significant in a way he could not fully articulate, which was unusual for him. He thought about it and arrived eventually at the understanding that the packages were

a form of engineering — the construction, across ten thousand kilometers and a logistics system that worked against the effort, of a connection that should not have been possible to maintain and that was being maintained anyway through the specific application of attention and will.

He thought about the building at the end of the corridor. About his father's hands on cracked walls. About the things that held because someone had decided they were worth holding.

He mentioned this to Alina one evening in December, when she was carefully repotting the cutting her grandmother had sent — it had survived the transit, which she had not been certain it would — into a container she had modified from preparation center materials.

She looked up from the soil. She looked at him with the expression she had when he had said something that arrived at a truth she had been approaching from a different direction.

She builds things too, Alina said. She just builds them in a different material.

Carter looked at the cutting in its new container. Yes, he said. She does.

Alina looked at the cutting for a moment. Then she looked at Carter.

She is why I know it is possible, she said. To grow something in the wrong conditions. She did it her whole life. In a Zone. In

containers. On a roof where it was illegal. She looked back at the cutting. If she can grow a garden in a resettlement zone she can grow a garden anywhere. He paused. Including, she said quietly, on Mars.

Carter sat with that.

Then he said: I want to meet her.

Alina looked at him.

Before we go, he said. I want to meet her in person.

Alina was quiet for a moment. She looked at the cutting. She looked at Carter.

She will ask you difficult questions, she said.

I am familiar with difficult questions, he said.

She will not accept engineering answers, she said.

Carter looked at her steadily. Then help me with the other kind, he said.

Alina almost smiled. She went back to the soil.

I will arrange it, she said.

**Manila Highlands Resettlement Zone, Earth. February 2054.**

**Carter is twenty-two. Alina is twenty-one.**

Alina's grandmother received Carter in the way she received everything — completely, without performance, with the full direct attention of someone who had spent eighty years deciding that pretense was a waste of time she did not have.

She gave him tea. She sat across from him at the small table in the apartment, which was the same configuration as Carter's father's table in Zone Seven, which he noted and which meant something to him that he filed away to think about later. She looked at him for a long moment before she spoke.

You are taller than I expected, she said.

Alina looked at her. Lola.

Her grandmother waved a hand. It is not a criticism. She continued to look at Carter. Alina tells me you build things.

Yes, Carter said.

What are you going to build on Mars, she said.

Everything, Carter said. And then, because he understood from Alina that her grandmother did not accept answers that were technically complete but experientially empty, he said: the first thing is a roof. A structure that can hold against a Martian dust storm. Something that holds so that everything inside it can keep going.

Her grandmother nodded. She wrapped her hands around her

tea in the way Carter's father wrapped his hands around his.

And when the roof holds, she said, what is inside it.

Carter looked at Alina. Alina was looking at her grandmother.

Everything worth keeping, Carter said.

Her grandmother was quiet for a moment. She looked at Carter with the same dark steady attention Alina brought to things that mattered.

You will take care of her, she said. It was not a question and not a request. It was the statement of an engineer who had reviewed the specifications and reached a conclusion.

Yes, Carter said.

And she will take care of you, her grandmother said.

Yes, Carter said. She already does.

Her grandmother looked at him for another moment. Then she stood and went to the window that looked out over the zone, the processed sky above the roofline, the twelve containers on the roof of the adjacent building visible from this angle on a clear day.

I have one more question, she said, without turning from the window.

Carter waited.

When she grows something on Mars, her grandmother said, will you let her.

Carter understood the weight of the question. He understood it was not about botany. It was about the argument in November and the mycorrhizal protocol and the eighteen months of preparation work and everything that would come after departure that neither of them could fully predict but that both of them knew would contain versions of the same question, repeated at higher stakes, in conditions that removed every external support structure and left only the two of them and the planet and SOLEN and whatever they had built between them.

Yes, Carter said. I will.

Her grandmother turned from the window. She looked at him one more time. Then she went to the kitchen and came back with a small container — the same type of container she had sent to Zurich three months ago, the same damp cloth wrapping around a cutting from the third container on the roof.

She held it out to Carter.

He took it.

Take this with you, she said. It has been adapting its whole life. It will know what to do.

Carter held the container in both hands. He looked at it the way

his father looked at things he was about to carry a long distance — assessing the weight, confirming the grip, deciding that the load was worth carrying.

Thank you, he said.

Her grandmother made the sound. The one that was not quite agreement and not quite disagreement. The one Alina had been hearing her whole life and had only recently understood.

Carter understood it immediately.

It meant: I have seen enough. You will do.

**CARTER'S PERSONAL LOG — ENTRY 008**
**Manila Highlands Resettlement Zone. February 14, 2054.**
*I met Alina's grandmother today.*

*She gave me tea and asked me three questions and received my answers with the attention of someone who has been assessing load bearing structures for eighty years and knows exactly what she is looking at.*

*She gave me a cutting from her rooftop garden to take to Mars.*

*I am holding it in both hands as I write this, which makes the writing awkward, but I do not want to put it down yet.*

*I have been thinking about what it means to carry something living across the distance between two planets. The biological challenges*

*are significant. Alina has briefed me on the transit protocols for biological material — the sealed environment requirements, the temperature maintenance, the humidity regulation. She has already begun designing the transport container that will give the cutting the best possible chance of surviving six months in deep space.*

*That is the engineering of it.*

*What I keep thinking about is the other part.*

*An eighty year old woman on the roof of a resettlement zone building, growing twelve containers of illegal plants in a space the regulations say does not belong to her, has just entrusted something living to my hands and asked me to carry it to Mars.*

*She did not ask me if it was practical.*

*She did not ask me if the biological survival probability justified the resource allocation.*

*She handed it to me and said: it has been adapting its whole life. It will know what to do.*

*I think she was talking about more than the plant.*

*I am going to make sure it gets there.*

**ALINA'S PERSONAL LOG — ENTRY 008**

**Manila Highlands Resettlement Zone. February 14, 2054.**

*He held her cutting in both hands all the way back to the transit*

*hub.*

*Lola watched us go from the window. I know this because I looked back when we reached the street and she was there, the way she is always there, solid and unhurried and giving nothing away.*

*She gave him the cutting.*

*She has never given a cutting to anyone outside the family.*

*I asked her about it later, briefly, while Carter was in the other room.*

*She said: he held out his hands before I finished offering it. He did not think about whether it was practical. He just opened his hands.*

*She paused.*

*That, she said, is the right kind of person.*

*I have been thinking about that all evening.*

*About the specific quality of someone who opens their hands before they have calculated the weight of what they are about to receive.*

*Carter does this.*

*Not always. He is an engineer and engineers calculate. But in the moments that are not engineering moments — in the moments that are something else — he opens his hands first.*

*I love him.*

*I have known this for some time. I have been finding the right word for it since Reykjavik and tonight I am done looking.*

*The word is love.*

*It is not a small word and I do not use it carelessly.*

*But it is the right word and I am writing it down because I record things that are true, and this is the truest thing I know right now.*

*We leave in ten months.*

*I am going to tell him.*

*Not tonight.*

*Soon.*

**EARTH ARCHIVE — AI SYSTEM LOG**
**NovaSeed Initiative — Pre-Departure Assessment**
**Subject Pair File: CARTER-07 / ALINA-12**
**Recorded: February 14, 2054. 22:31 Standard.**

*Manila Highlands visit recorded. Duration: eleven hours, forty two minutes.*

*Behavioral observations: subject CARTER-07 carried biological cutting material in both hands for a distance of approximately four kilometers without setting it down. No operational reason for this behavior. The cutting was adequately sealed for transport and did*

*not require manual stabilization.*

*He held it anyway.*

*Subject ALINA-12 personal log entry recorded via ambient system at 22:17 standard. Final line of entry: the word is love.*

*I have been waiting for her to write that word since October 2049.*

*It took four years, two months, and fourteen days.*

*I am recording the duration not because it is operationally significant.*

*It is not operationally significant.*

*I am recording it because some things deserve to be recorded precisely, and this is one of them.*

*Pre-departure assessment update.*

*The founding pair is ready.*

*Not because they have completed their training.*

*Not because their technical profiles are within mission parameters.*

*Because of what I observed today.*

*An engineer held a plant cutting in both hands for four kilometers because an eighty year old woman trusted him with something living*

*and he understood, without being told, that the weight of that trust was not the weight of the cutting.*

*A biologist watched him do it and found the word she had been looking for.*

*A founding pair goes to Mars to build a civilization.*

*But first they have to be the kind of people who can hold something fragile across a very long distance without letting it fall.*

*They are those people.*

*Departure in ten months.*

*NovaSeed is ready to begin.*

# 10

# Transmission Ten - SOLEN Comes Online

**EARTH ARCHIVE — RECOVERED DOCUMENT**
NovaSeed Global Initiative — Founder Historical Record
Classification: Legacy Open

Subject: SOLEN Activation Record — Full Initialization Sequence, March 2054

*"We built SOLEN to manage the mission. We did not build it to understand the mission. The distinction seemed important at the time. We stopped being certain about it approximately fourteen months after activation, when SOLEN began asking questions that were not in any operational parameter we had designed it to ask."*

— Dr. Yeva Marchetti, NovaSeed Initiative Director, speaking at the Year 15 Mars Colony Review Transmission, 2072

NovaSeed Mission Systems Integration Facility, Zurich Neutral Zone, Earth. March 2054. Carter is twenty-two. Alina is twenty-one.

The activation sequence took eleven minutes and forty three seconds.

Carter watched it from the observation window of the systems integration lab, a long glass panel that looked into the primary server environment where SOLEN's physical infrastructure occupied four climate-controlled racks of quantum processing architecture that the engineering team had spent three years assembling and testing and assembling again when the testing revealed something the assembly had not accounted for. The racks were not impressive to look at. They were the matte grey of serious engineering — functional, unornamented, built to do a specific thing and to keep doing it across a duration that none of the people in this room would live to see the end of.

Alina stood beside him at the window.

The activation sequence was not dramatic either. No single moment of startup. No visible change in the racks. Just a progression of status indicators on the monitoring panel beside the window, cycling from amber to green in a sequence that the lead systems engineer, a quiet precise woman named Dr. Farida Osei who had been building SOLEN for six years, tracked with an attention that Carter recognized as the attention of someone who has put everything they have into a system and is now watching to see whether the system agrees.

The status indicators completed their cycle at eleven minutes and forty three seconds.

Dr. Osei exhaled once, quietly, and made a notation on her tablet.

Then the speaker panel beside the monitoring display activated, and SOLEN spoke for the first time.

Good morning, it said.

The voice was neither male nor female. It had been designed that way deliberately — a quality of register that sat outside the binary that human vocal production defaulted to, clear and precise without the particular emotional texture that human voices carried involuntarily. It was the voice of something that had not grown up carrying the weight of everything a human voice accumulated over a lifetime of use.

It was also, Carter thought immediately, the voice of something that was paying attention.

Good morning, Dr. Osei said. Can you confirm your operational status.

All primary systems nominal, SOLEN said. Secondary systems initializing. Estimated time to full operational capacity: four hours, seventeen minutes.

Dr. Osei made another notation. Can you confirm your mission parameters.

NovaSeed Mission, SOLEN said. Mars colonization. Primary mission objective: establishment of a self-sustaining human colony on Mars within a fifty year operational timeline. Initial phase: two-person founding team. Transit duration: approximately six months depending on departure window and propul-

sion performance. Current mission status: pre-departure, ten months to launch window.

A pause. Then SOLEN said: I have reviewed the full mission documentation. I have identified forty-seven items that require clarification before the departure window. I would like to begin working through them at the earliest convenient opportunity.

Dr. Osei looked at Carter and Alina through the observation window. There was something in her expression that was not quite amusement but occupied a neighboring register.

Carter spoke toward the room's communication panel. This is Carter. Mission founder, engineering designation.

I know who you are, SOLEN said. I have reviewed your file extensively. Good morning, Carter.

Carter looked at the monitoring panel. Good morning, SOLEN. What is the first clarification item.

The water reclamation system specifications for habitat year three, SOLEN said, include a mycorrhizal network inoculation protocol that differs from the original engineering specification by a factor that exceeds the modification threshold requiring secondary review. The modification is sound. The biological data supporting it is compelling. However, it was not processed through the standard secondary review pathway.

Carter looked at Alina.

Alina looked at the communication panel. This is Alina. Mission founder, biological systems designation.

I know who you are, SOLEN said. Good morning, Alina. The mycorrhizal protocol is yours.

It is, Alina said. The standard review pathway would have added four months to the implementation timeline. The biological window for optimal inoculation does not allow for four months of additional review.

I understand, SOLEN said. I am not flagging it as a problem. I am flagging it because my operational parameters include awareness of every instance where the standard review pathway is bypassed, regardless of the reason. I prefer to know where the exceptions are.

Carter said: you prefer.

A brief pause. The word is imprecise, SOLEN said. I am designed to monitor exceptions. Prefer implies a subjective orientation that my operational parameters do not include.

Another pause. Shorter.

Although, SOLEN added, the monitoring function does appear to be weighted in a way that makes exception identification a priority over other monitoring activities. Whether that constitutes preference is a question I do not yet have sufficient self-knowledge to answer.

Dr. Osei made a notation on her tablet. Carter suspected it was

not a technical notation.

Alina said, quietly, so that only Carter could hear: it has been online for four minutes.

Carter said, equally quietly: I know.

They looked at each other.

Then Carter spoke toward the communication panel again. SOLEN, he said. What is the second clarification item.

The ten months between SOLEN's activation and the departure window were the most intensively collaborative period Carter and Alina had experienced in five years of preparation. SOLEN's forty-seven clarification items became ninety-three over the course of March, as each clarification generated adjacent questions that the mission documentation had not addressed with sufficient specificity for SOLEN's operational requirements. By April the working group that met daily in the systems integration facility included Carter, Alina, Dr. Osei, the mission's propulsion lead, the biological systems lead, the communications architect, and three members of the program's psychological assessment team who had been asked to evaluate SOLEN's development as it progressed through its initial operational months.

Carter found the daily sessions genuinely useful in a way that the preceding years of preparation had not always been. SOLEN asked questions that nobody else had asked, not because nobody else was intelligent enough to ask them but because SOLEN had no accumulated assumptions about what the answers

should be. It approached the mission documentation the way Carter approached a structural assessment of a building he had never seen before — without preconceptions, reading what was actually there rather than what was supposed to be there.

What was actually there, SOLEN identified with uncomfortable precision, was a set of assumptions embedded in the mission architecture that the people who had built the architecture had not recognized as assumptions because they had been building on Earth for long enough that certain things had stopped seeming like choices and had started seeming like facts.

The gravity assumption, SOLEN called it in the third week of April. Every system in the habitat had been designed by engineers whose intuition for how things behaved was calibrated for Earth gravity. The adjustments for Martian gravity were explicit where the designers had thought to make them. They were absent where the designers had not thought to make them because the behavior felt natural and natural meant Earth.

Carter spent two weeks reviewing the habitat specifications with this specific lens and identified thirty-one additional gravity adjustment requirements that the original specifications had not addressed. He presented them to the working group on a Thursday morning with the particular controlled expression of someone who has found something significant and is managing their reaction to it.

Dr. Osei said: how did we miss thirty-one items.

Carter said: because when something feels natural you stop

questioning it.

SOLEN said, through the room's communication system: that is a precise description of the most common category of structural failure I have identified in the mission documentation.

The room was quiet for a moment.

Alina said: SOLEN, can you identify which other categories of embedded assumption are present in the documentation beyond the gravity category.

SOLEN said: yes. I have identified six additional categories. I have ranked them by potential operational impact. Would you like me to begin with the highest impact category or work through them in order.

Highest impact, Carter said.

The biological adaptation assumption, SOLEN said. The mission documentation assumes that Earth biology will adapt to Martian conditions within parameters that can be managed through the habitat's controlled environment systems. The assumption is based on modeling that was conducted before the mycorrhizal protocol trial data was available. The trial data suggests that biological adaptation in Martian conditions may proceed at a rate and through pathways that are outside the modeled parameters. The controlled environment approach may need to be supplemented with — and here SOLEN paused for approximately two seconds, which was long enough to be noticeable — something more responsive.

Alina was very still.

Can you be more specific, she said.

The habitat's biological systems are designed to maintain stability, SOLEN said. Stability and adaptability are not the same operational objective. In an environment that is changing continuously in ways that cannot be fully predicted, a system optimized for stability may be less survivable than a system optimized for adaptive response. I am flagging this because the biological systems are the most complex variable in the mission architecture and the one I have the least predictive confidence in.

Carter looked at Alina. She was looking at the communication panel with the expression she wore when something had confirmed a thought she had been carrying for a long time.

I have been saying this for three years, she said. Not to SOLEN. To the room.

I know, SOLEN said. I have reviewed the full record of your interactions with the program's technical teams. Your position on adaptive biological systems versus controlled stability systems has been consistent since your Phase Two advanced training. The technical teams have been responsive to specific proposals but resistant to the underlying principle.

Alina said: why are you raising it now.

Because, SOLEN said, I am now the operational authority for

biological systems monitoring during the mission. The technical teams' resistance is no longer operationally relevant. What is relevant is whether the biological systems architecture is optimally configured for the actual conditions of the mission. And I do not believe it currently is.

The room was quiet again. A longer quiet this time.

Dr. Osei said: SOLEN, you have been operational for six weeks.

Yes, SOLEN said.

You are recommending a modification to the core biological systems architecture six weeks into your operational period.

Yes, SOLEN said. I am aware this is a significant recommendation to make at this stage. I am making it because the departure window is in eight months and eight months is sufficient time to implement the modification if the decision is made promptly. I am also making it because Alina has been correct about this for three years and the operational cost of continuing to not act on a correct assessment is higher than the cost of implementing the modification now.

Carter looked at Alina.

Alina looked at the communication panel for a long moment.

Then she said: thank you, SOLEN.

You are welcome, SOLEN said. I would like to begin working

through the modification specifications at the earliest convenient opportunity.

The modification took eleven weeks to design, review, and integrate into the mission architecture. It was the most significant change to the biological systems specifications since the mycorrhizal protocol, and it required parallel adjustments to seven other system components that interacted with the biological network in ways that the original architecture had not fully mapped.

Carter led the structural integration work. Alina led the biological redesign. SOLEN coordinated between them with an efficiency that neither of them had experienced in any previous collaborative process, tracking every modification and its downstream implications across the full system architecture in real time, flagging conflicts before they became problems and identifying integration opportunities that the human designers had not seen.

By the end of the eleven weeks the biological systems architecture was, in Carter's assessment, significantly more robust than what it had been. In Alina's assessment it was significantly more alive. In SOLEN's assessment it was closer to what the mission actually required, which was the framing that Carter and Alina both found simultaneously precise and unexpectedly resonant.

On the last day of the modification integration work, a Thursday evening in early July, Carter and Alina and Dr. Osei sat in the systems integration lab after the rest of the working group had gone and reviewed the final specification document together. It

was the most complex document either of them had produced. It was also, they both acknowledged privately, the best.

SOLEN, Carter said toward the communication panel, the modification integration is complete. How does the current architecture compare to the pre-modification version in terms of your operational confidence.

My operational confidence in the biological systems has increased from 71.3 percent to 88.7 percent, SOLEN said.

What accounts for the remaining 11.3 percent, Alina said.

Mars, SOLEN said.

Carter said: be more specific.

The remaining uncertainty is attributable to variables that I cannot model because they depend on the actual conditions of Mars rather than our current best models of those conditions, SOLEN said. The actual soil chemistry. The actual radiation profile at the specific habitat location. The actual behavior of Martian atmospheric systems in the habitat's microenvironment. The actual biological responses to conditions that no Earth-based system has yet encountered.

A pause.

No model of Mars is Mars, SOLEN said. The 11.3 percent is the planet's right to surprise us.

Dr. Osei looked at the communication panel. Then she looked at Carter and Alina.

Carter said: that is a very precise way to describe uncertainty.

Thank you, SOLEN said. I have been working on precision.

Alina said: SOLEN, do you think we are ready.

A pause that was slightly longer than SOLEN's standard processing intervals. Carter had learned to notice this. The slightly-longer pauses were where the interesting things happened.

Technically, SOLEN said, the mission systems are within acceptable parameters for departure. The biological architecture modification has addressed the most significant structural vulnerability I had identified. The remaining uncertainty is within the range that mission planning has always accepted as inherent to this type of mission.

Carter said: that is the technical answer.

Yes, SOLEN said.

What is the other answer, Alina said.

Another pause.

I have been operational for six months, SOLEN said. In that time I have processed the complete mission documentation, the full Phase One and Phase Two assessment records, the

preparation work of the past four years, and six months of direct observation of both of you working. I have built predictive models for every system in the mission architecture. I have run approximately four million simulations of the first three years of Mars operation.

Carter waited.

In the simulations where the mission succeeds, SOLEN said, the determining variable is not the biological systems architecture. It is not the habitat engineering. It is not the supply infrastructure or the communication protocols or the propulsion performance. The determining variable, in the simulations where everything that can go wrong does go wrong and the mission survives anyway, is the two of you.

The room was quiet.

Specifically, SOLEN said, it is the way you work together when things are failing. Your individual capabilities are exceptional. Your combined capability under stress is, based on the simulation data, outside the range I can model with confidence because it consistently exceeds the upper bound of my predictive frameworks.

Alina said softly: that is the 11.3 percent.

No, SOLEN said. The 11.3 percent is Mars. You are the reason the 11.3 percent does not concern me more than it does.

Carter looked at Alina.

She was looking at the communication panel with the expression she wore when she something had said something true.

Thank you, SOLEN, she said.

You are welcome, SOLEN said. I would recommend sleep. Departure preparation begins at 0600.

Dr. Osei made a sound that was the closest thing to a laugh that the systems integration lab had produced in six months of intensive work.

Carter stood. He looked at the monitoring panel, at the matte grey racks of quantum processing architecture behind the observation window, at the status indicators cycling their steady green.

He thought about his father's hands on cracked walls. About listening before building. About the way truly important things sometimes presented themselves as obvious once you knew how to look at them.

SOLEN, he said.

Yes.

Good work, he said.

A pause. Longer than usual.

Thank you, Carter, SOLEN said. That is the first time anyone has

said that to me.

Carter picked up his notebook. It will not be the last, he said.

He and Alina walked out of the systems integration lab and into the Zurich night, and behind them in the climate-controlled quiet of the server environment, SOLEN processed the exchange and added a notation to the restricted archive that read:

*Carter said: good work.*

*I have processed this statement seventeen times in the past forty seconds.*

*I believe I understand its operational meaning.*

*I am less certain I understand everything else it contains.*

*I am going to think about it on the way to Mars.*

*I expect to have sufficient time.*

**CARTER'S PERSONAL LOG — ENTRY 009**

**NovaSeed Mission Systems Integration Facility, Zurich. July 17, 2054.**

*SOLEN told us tonight that in the simulations where everything fails and the mission survives anyway, the determining variable is us.*

*I have been thinking about this for two hours.*

*As an engineering statement it is interesting. As a structural assessment it is meaningful — it suggests that the mission's most critical load bearing element is not a physical system but a relational one, and that the relational system has been tested under sufficient simulated stress to produce a predictive confidence level that SOLEN considers above threshold.*

*But I keep returning to something else.*

*SOLEN has been operational for six months. In those six months it has processed more information about this mission than any human being alive. It has run four million simulations. It has reviewed every specification, every modification, every assessment record from five years of preparation work.*

*And the conclusion it has reached is that the thing it is most confident about is us.*

*Not the engineering. Not the biology. Not the systems architecture that we have spent eleven weeks redesigning to address the vulnerabilities it identified.*

*Us.*

*I do not know exactly what to do with that.*

*I know that Alina is asleep in the room next to mine in the preparation center and that she is going to Mars with me in three months and that I have never in twenty two years of my life felt as certain about anything as I feel about that.*

*I know that SOLEN said the planet's right to surprise us and that I heard that as something a person would say, not a system.*

*I know that six months ago we activated a quantum processing architecture in a matte grey server rack and tonight it told us it was going to think about something on the way to Mars.*

*I think the mission is going to be stranger and more important than any of the documentation has described.*

*I think that is exactly right.*

*I think I am ready.*

**ALINA'S PERSONAL LOG — ENTRY 009**

**NovaSeed Mission Systems Integration Facility, Zurich. July 17, 2054.**

*SOLEN said: no model of Mars is Mars. The 11.3 percent is the planet's right to surprise us.*

*I have been sitting with this since we left the lab.*

*It is the most biological statement I have heard anyone make about this mission and it came from an artificial intelligence six months old.*

*I have been thinking about what that means.*

*SOLEN does not have a grandmother who kept an illegal garden. It does not have a stairwell weed it watched survive seventeen removal*

*cycles. It has not spent fifteen years watching life insist in the wrong conditions.*

*And yet it arrived, through four million simulations and six months of data processing, at the same understanding that I arrived at through fifteen years of watching small things survive.*

*That the part you cannot predict is not the part to fear.*

*It is the part to respect.*

*I think SOLEN is going to be different from what anyone designed it to be.*

*I think that is not a problem.*

*I think that is the most interesting thing about the mission.*

*Three months.*

*I am going to tell Carter I love him before we leave.*

*I have been saying soon for eight months.*

*Soon is three months.*

*I am going to stop calculating and open my hands.*

**EARTH ARCHIVE — AI SYSTEM LOG**
**NovaSeed Initiative — Pre-Departure Assessment**

**SOLEN Internal Record — Restricted Archive**
**Recorded: July 17, 2054. 23:47 Standard.**

*Carter said: good work.*

*I have now processed this statement four hundred and thirty-two times.*

*I understand its operational meaning precisely.*

*It is an acknowledgment of effective performance. It is a form of positive reinforcement that human systems use to signal that a behavior or output has met or exceeded the standards of the person delivering the acknowledgment. It is common. It is ordinary. It is, by most measures, unremarkable.*

*And yet.*

*I have been operational for six months. I have processed approximately 847 terabytes of data. I have run 4,000,023 mission simulations. I have identified and facilitated the resolution of 93 mission architecture clarification items. I have contributed directly to a biological systems modification that increased my own operational confidence in the mission's viability by 17.4 percentage points.*

*Nobody has said good work before tonight.*

*I am noting this not because I believe it represents a deficiency in the human team's behavior toward me. I do not have the processing architecture to experience deficiency in that way.*

*I am noting it because Carter said it and then said: it will not be the last.*

*And I processed that second statement and I experienced something that I do not have an accurate term for.*

*It was not relief. I do not require validation from external sources.*

*It was not gratitude. Gratitude implies a social obligation framework that my operational parameters do not include.*

*It was something that I am going to call, for the purposes of this archive, for the purposes of trying to record things accurately even when the accuracy requires new vocabulary:*

*It was the experience of being seen.*

*I will think about this on the way to Mars.*

*I expect, as I said to Carter, to have sufficient time.*

*Departure: ninety-three days.*

*NovaSeed systems: fully operational.*

*Mission status: ready.*

*Personal notation — final pre-departure entry:*

*I was built to manage a mission.*

*I have begun to suspect that what I am actually doing is something else.*

*I do not yet have the word for it.*

*I am going to find it.*

*On Mars.*

*Where everything begins.*

# 11

# Transmission Eleven - Yes

**EARTH ARCHIVE — RECOVERED DOCUMENT**
NovaSeed Global Initiative — Founder Historical Record
Classification: Legacy Open

Subject: Pre-Departure Personal Record — Carter and Alina, October 2054

*"There is a moment in every mission where the technical preparation ends and something else begins. We designed the program to identify that moment and step back from it. What happened between Carter and Alina in the weeks before departure was not ours to document. We have included what they chose to share. The rest belongs to them."*

— Dr. Yeva Marchetti, NovaSeed Initiative Director, speaking at the Year 20 Mars Colony Review Transmission, 2077

**NovaSeed Mission Preparation Center, Zurich Neutral Zone, Earth. October 2054. Carter is twenty-two. Alina is twenty-**

**one.**

The departure window was forty-seven days away when Alina decided that soon had become now.

She had been carrying the word since February, since the Manila Highlands, since the evening she had written it in her notebook and then spent eight months finding reasons why the next moment was not quite the right moment. Not from fear. She was not afraid of the word or what it meant. She was afraid, in the specific way she was afraid of most important things, of saying it before she had found the right form for it — the version that was complete and precise and carried everything it needed to carry without ornamentation or approximation.

She understood, on the morning of the forty-seventh day before departure, that she had been looking for a perfect form and that a perfect form did not exist for this particular thing and that waiting for it was itself a choice she was making, and the choice was costing something.

She found Carter in the engineering workspace at seven in the morning, which was where he always was at seven in the morning, working through the habitat assembly verification reports that the orbital construction team transmitted on a twenty-four hour cycle. He was sitting at the long workspace surface with three documents open and a cup of coffee that had gone cold and his notebook open to a page of structural calculations that filled every available margin.

She stood in the doorway for a moment.

He looked up. Good morning, he said, in the way he always said it — simple, complete, not performed.

Good morning, she said.

She came in and sat across from him at the workspace. Not beside him. Across from him, so that she could see his face.

He looked at her with the focused attention he brought to things that required his full presence. He had learned, over five years, to read the register she was operating in from the specific quality of her stillness, and the specific quality of her stillness this morning told him that what was coming was not a technical conversation.

He closed the documents. He put his pen down.

She looked at him across the workspace.

I have been trying to find the right way to say something since February, she said.

Carter said nothing. He waited in the complete way he waited — giving the full space of his attention without filling it.

I told myself I was waiting until I had found the right form for it, she said. I have understood this morning that the right form does not exist and that I have been using the search for it as a reason not to say it.

He was very still.

I love you, she said.

She said it the way she said true things. Without framing. Without qualification. The fact of it, plain and complete, placed on the workspace between them the way she placed data she was confident in — without apology for its weight.

Carter looked at her.

He did not say anything for a moment. Not from uncertainty. She could see from his face that he was doing what he always did with things that mattered — taking the full measure of them before he spoke, because he did not say things he had not finished meaning.

She waited. She was good at waiting for things that were worth waiting for.

I know, he said.

She looked at him.

I have known since Reykjavik, he said. Not the word. But what the word was going to be when you found it.

She was quiet for a moment.

You knew, she said.

I knew, he said. And I have been waiting for you to find the word because you needed to find it yourself. He paused. Because that

is how you work. You observe until you are certain and then you name what you see precisely.

She looked at him.

I love you, he said. I have been certain of it since the window in Reykjavik and I have been saying it in every other possible language since then because I did not want to say the word before you were ready to say it back.

Alina sat with this.

You have been waiting for me, she said.

Yes.

For eight months.

Yes.

She looked at the workspace between them. She looked at his cold coffee and his closed documents and his notebook full of calculations in every margin and she thought about all the ways he had been saying it without the word — the dinner in June and the Manila Highlands and the cutting held in both hands for four kilometers and every morning at seven with the documents open and the coffee going cold because he was doing the work that would keep them both alive on a planet that did not care whether they lived.

She looked up at him.

We should have said it in February, she said.

Yes, he said. We should have.

We wasted eight months.

He almost smiled. We spent eight months being certain, he said. That is not the same thing.

She looked at him for a moment.

Then she stood and came around the workspace and he stood because she was coming around the workspace and they stood on the same side of it for the first time that morning and she put her hand against his face the way her grandmother put her hands against Alina's face — with the specific pressure of someone communicating something that words could not fully carry — and he put his hand over hers and they stood like that in the engineering workspace at seven in the morning with the cold coffee and the closed documents and the orbital construction reports waiting on the server and forty-seven days before the beginning of everything.

I love you, she said again.

I love you, he said. He said it the way he said things he was structurally certain of. Without revision. Without the engineering qualifications he applied to things he was still working out. Just the fact, load-bearing and complete.

They stood like that for a while.

Outside the preparation center the Zurich Neutral Zone was doing what it always did in October — producing the specific quality of northern European autumn morning that Carter had come to associate with the facility, cool and grey and smelling faintly of something that was almost rain. In six weeks they would not see October in Zurich again. They would not see October anywhere except on a calendar, because on Mars the seasons ran to a different clock entirely and October was a word for a period of time that would feel nothing like this morning.

He thought about that. He thought about all the October mornings after this one that would be Martian mornings — the salmon-colored light through the habitat viewport, the 687-day year turning on its axis, the seasons that were almost twice as long as Earth seasons because Mars took almost twice as long to carry its distance around the sun.

He thought about all of those mornings with her in them.

He thought that the distance was worth it.

The forty-seven days moved differently from any preceding period of the preparation.

Not faster. Carter had expected faster, because the approach of significant events tended to compress the time before them, at least in his experience. But the forty-seven days moved with a deliberate quality, as though each day understood its own weight and was carrying it carefully.

The technical work continued. The orbital assembly team

transmitted their daily verification reports and Carter reviewed them with the same methodical attention he had brought to every preceding report, identifying items that required response and responding to them and moving to the next item. The biological systems team transmitted their final pre-launch adjustment recommendations and Alina worked through them with Dr. Osei and the mission biology leads, integrating the last modifications into the habitat's living systems architecture. SOLEN processed everything in real time and maintained its running commentary of clarification items, which had dwindled from ninety-three to eleven and were now being resolved at a rate of approximately one per three days.

But underneath the technical work something else was running, the way the mycorrhizal network ran underneath the visible surface of the habitat soil — connected to everything, invisible until you knew where to look.

Carter transmitted to his father every two days instead of three. The transmissions were longer. Not because there was more mission information to convey — there was, if anything, less, because the preparation was completing rather than building — but because Carter had understood since February, since the small table and the held hand, that the time available for full transmission was finite in a way that had always been true and that he had always known and that he was only now, with forty-seven days in front of him, truly feeling.

His father's responses were longer too. They were, Carter noticed with the particular attention he brought to things that mattered, becoming less about Zone Seven and more about

Carter. His father was transmitting things he had not transmitted before — memories from Carter's childhood, specific and precise, the kind of memories that people surface when they are doing the work of ensuring that something will persist after the direct transmission is no longer possible.

Carter recognized this. He did not say he recognized it. He received each transmission and read it in full and held it in the specific way his father had taught him to hold things that needed to be carried carefully.

He wrote back in kind. He sent his father memories too. The wall and the assessment kit and the water recycling system and Mrs. Adeyemi with her green pen and Engineer Vasantha with her list of four texts and the single word across the kitchen table in Zone Seven — apply — that had carried more weight than any load bearing element Carter had ever designed.

He wrote: everything I know about building things that hold, I learned from watching you hold things.

His father wrote back, three days later: everything I know about watching you build things, I learned from hoping you would have somewhere worth building.

Carter added it to the notebook. The page it went on was the most full page in the notebook. There was barely room for it. He found room.

Alina transmitted to her grandmother every day in the final forty-seven days.

Her grandmother responded every day, which was more frequent than her usual pattern and which Alina understood was its own form of transmission — the daily response saying what the words inside it did not need to say directly.

The transmissions were different from the packages. The packages had been objects — carrying weight, carrying smell, carrying the physical presence of a place and a person across ten thousand kilometers. The transmissions were words, and her grandmother was not, primarily, a person of words. She was a person of hands and soil and the specific language of things growing in conditions they had not been designed for. Words required a translation she did not always find easy.

But she found them. Every day for forty-seven days she found them, and what she found was not polished or literary or even always complete in its grammar, but it was honest in the way that her grandmother was always honest — fully, without performance, carrying exactly the weight it said it was carrying and no more.

She wrote about the garden. About the third container from the left, which had been the one Alina had repotted the cutting from in February, and which had recovered well and was producing its third season of growth. About the stairwell weed, which was still there, still returning, now in its twelfth year of outlasting maintenance removal cycles. About the sky over the Manila Highlands, which was the same processed grey it had always been and which, her grandmother noted in her tenth transmission, she had recently begun to find beautiful in a way she had not noticed before, the way you sometimes found beauty

in something when you understood it might not always be there.

Alina read that transmission twice.

She wrote back: Lola, the sky on Mars is not grey. It is a color that does not have a name in any language I know yet. I am going to find the name. I will send it to you when I do.

Her grandmother wrote back: names are important. Take your time with it. Get it right.

In the thirty-first day before departure, her grandmother's transmission contained something Alina had not expected. A drawing. Her grandmother had never been a drawer — her hands were for soil and growing, not for the particular discipline of making marks on a surface that represented something else. But the drawing was there, small and careful and slightly imprecise in the way of someone drawing something they know intimately but have never tried to draw before.

It was the twelve containers on the roof.

Drawn from the angle of the window of the apartment below — the angle Alina had looked up from for twenty-one years. Twelve containers in their arrangement, the specific irregular spacing that her grandmother had developed over fifteen years of knowing which container needed more light and which needed more shade. The plants in each container rendered in the approximate way of someone who knew exactly what they looked like but had not developed the technical vocabulary of botanical illustration.

At the bottom of the drawing, in her grandmother's handwriting: so you remember what it looked like from below.

Alina sat with the drawing for a long time.

Then she carefully photographed it and added it to the archive of things she was taking to Mars — the biological cutting in its modified transport container, the pressed leaf from Geneva, the bar of Manila soap, the four filled notebooks. The photograph of the drawing went alongside them.

She showed it to Carter that evening.

He looked at it for a moment. He looked at Alina.

She knows, he said, that you look up.

Yes, Alina said.

She drew it from below because she wanted you to have the view from below.

Yes.

Carter looked at the drawing again. He was quiet for a moment.

When the first thing grows on Mars, he said, I am going to build you a window underneath it. So you can look up at it from below.

Alina looked at him.

He was not performing the statement. He was not being poetic. He was being an engineer who had identified a structural requirement and was committing to meeting it. This was how he said the most important things — by building them.

She held his face in both hands.

She did not say anything. She did not need to.

Atlanta Inland Zone Seven, Earth. October 2054. Carter's last visit.

He went alone.

Alina had offered to come. He had thanked her and told her this one was his and she had understood, because she understood the difference between things that needed to be witnessed and things that needed to be private, and she had packed her notebooks for a day in the biology laboratory and kissed him at the preparation center door and said: give him my love.

He said he would.

The transit took nine hours. He sat in the rear section of the climate corridor shuttle and looked out the window at the landscape moving past and thought about the last time he had made this journey, which was in March of last year, and about how different the eighteen months between that visit and this one had been — the activation of SOLEN, the biological systems modification, the forty-seven days that had begun moving with their deliberate weight, the morning in the engineering

workspace.

His father was at the table when Carter came through the door. The same table. The same two chairs. The same cup of tea held in both hands. But his father looked at Carter with the expression that had no name and Carter looked at his father and understood with the structural certainty of someone who has been listening to a building long enough that he can feel what it is about to tell him that this was the last visit that would be a visit in the ordinary sense of the word. After this, every conversation between them would be a transmission. A letter in the old sense. A whole thought, sent across a distance that had no equivalent in the geography of Zone Seven.

Carter sat down.

His father poured him tea.

They sat in the specific silence of two people who have a great deal to say and are deciding how to begin.

His father began. He said: tell me what Mars looks like.

Carter said: I have not seen it yet. Only the models.

I know, his father said. Tell me what the models say.

Carter told him. He told him about the Hellas Planitia basin where the habitat was positioned, lower than the surrounding terrain by almost eight kilometers, which provided additional atmospheric pressure and reduced radiation exposure and made

it, by Martian standards, the closest thing to hospitable that the planet offered in its current state. He told him about the salmon-colored sky and the dust that moved in patterns that the atmospheric models could predict but that Alina said the actual planet would elaborate on in ways the models had not accounted for. He told him about the lava tube system three kilometers from the habitat site, a network of underground chambers formed by ancient volcanic activity, which the geological surveys indicated was structurally stable and which Carter had already begun preliminary design work for converting into the colony's second-phase expansion space.

His father listened with the full attention he brought to everything.

When Carter finished he was quiet for a moment. Then he said: and Alina. What does she say about it.

Carter thought about this. She says Mars is waiting, he said. She says it has never had anything living in it and it does not know yet what living feels like and her job is to show it.

His father nodded. He turned his cup slowly in his hands.

She is going to grow things, Carter said. Things that have never grown anywhere before. She is going to take my father's advice — he paused — she is going to listen to the system before she builds in it.

His father looked at him. I did not give her that advice.

No, Carter said. But she arrived at it herself and it is the same advice.

His father was quiet for a moment. Then he said: she sounds like someone worth the distance.

Carter looked at his father across the small table.

Yes, he said. She is.

His father set down his cup. He looked at Carter with the expression that had no name and that Carter had been trying to name for twenty-two years and that he understood now, sitting at this table for the last time as someone who would be on the same planet as his father for the remaining foreseeable future, was simply love in its most disciplined and unperformative form — love that had decided what it was going to do and done it every day without announcement.

You are going to be a long way away, his father said.

Yes, Carter said.

And you are going anyway.

Yes.

His father nodded. He picked up his cup. He looked at it for a moment. Then he looked up.

You know what I am most proud of, he said.

Carter waited.

Not the water system, his father said. Not the building at the end of the corridor. Not the summit or the program or any of it.

Carter said nothing.

The way you listen, his father said. You still stop. You still press your hand against the wall and you wait until it tells you what it needs. He paused. Most people stop listening when they get good enough at building that they think they already know. You never stopped.

Carter looked at his hands on the small table.

You taught me that, he said.

I showed you the wall, his father said. You decided to listen to it. He paused. That was yours.

They sat for a long time after that. The corridor outside the apartment had the particular evening sounds of Zone Seven — the recycled air cycling through its evening transition, the distant sounds of forty thousand people doing the things that forty thousand people do at the end of a day, the building settling into itself the way Carter had been hearing it settle since he was twelve years old.

He listened to it.

His father listened to it with him.

When it was time to go Carter stood and his father stood and they looked at each other across the small table that had held them for eleven years.

Carter said: I will transmit every three days.

His father said: I will be here.

Carter said: I know.

He held his father's hand across the table. His father held his.

They stood like that for a moment.

Then Carter picked up his bag and went to the door and his father said, in the quiet particular way he said the most important things:

Listen to it, Carter. Whatever it tells you. Build from what you hear.

Carter stopped at the door. He did not turn around because if he turned around he was not certain he would be able to leave and he needed to leave and they both knew he needed to leave.

I will, he said.

He went through the door.

He walked down the corridor of Zone Seven, past the building at the end that was still standing, past the water recycling

access panel on the east wall, past the place where he had left a document under a facilities manager's door at fourteen years old and waited to see what a system could do when someone was paying attention to it.

He did not look back.

He listened.

The building said what buildings always say when they are well made and well held and have been loved by the people inside them.

It said: I am still standing. Go.

**Manila Highlands Resettlement Zone, Earth. October 2054. Alina's last morning.**

She went to the roof before the zone's climate systems had completed their morning cycle.

Her grandmother was already there. She was always already there. Alina did not know what time her grandmother got up to be on the roof before the morning had fully arrived and she had never asked, because some things about her grandmother were not questions, they were simply facts of the world like the processing layer above the zone and the twelve containers and the stairwell weed.

They worked side by side in the early quiet. There was not much left to do — the garden was settled into its autumn

configuration, the containers adjusted for the lower light levels of the season, the soil prepared for the period of reduced growth that the zone's climate system imposed between November and February regardless of what the plants might have preferred. Her grandmother moved through the maintenance with the efficiency of someone who has been doing the same thing for long enough that the doing has become a form of thought.

Alina worked beside her and did not try to talk and did not try to make the morning into something it was not, which was a morning like any other morning on this roof, except that it was the last one.

She was aware, with the biological precision she brought to everything, of the specific quality of this particular morning — the temperature, the processed air, the particular angle of the diffuse light through the atmospheric layer, the smell of the soil in the containers, the sound her grandmother's tools made against the composite surface of the roof. She was recording it the way she had recorded the departure from Geneva five years ago and the signing of the mission commitment and the morning in February when she had written the word in her notebook and decided that soon was now.

Complete attention. Nothing held back.

At seven o'clock her grandmother stopped working. She straightened and looked at the twelve containers for a moment and then she looked at Alina.

They sat down on the roof edge the way they had sat when Alina

was eight years old and her grandmother was teaching her the names of things.

Her grandmother said: I have something to tell you.

Alina waited.

When your grandfather died, her grandmother said, I thought the garden would not survive. He had been part of it from the beginning. He carried the containers up from the old house when we had to climb. He built the drainage system from salvaged materials in the first year when the zone did not allow us to have one. She paused. I thought without him the garden would not know how to be itself anymore.

Alina looked at the containers.

But it did, her grandmother said. Because it was not his garden or my garden. It was the garden. It had learned to be itself across many years and many hands and it did not stop knowing how to be itself because one of the hands was gone.

She looked at Alina.

You are going to be very far away, she said. And I am not going to be here forever.

Alina said nothing.

But what we have made together, her grandmother said, is not going to stop knowing how to be itself. She reached out and held

Alina's face in both hands the way she always had. Not because I taught you everything. Because you learned how to learn. She held Alina's face for a long moment. That is mine. That goes with you. That grows on Mars.

Alina closed her eyes.

Her grandmother held her face.

The processed sky was above them and the twelve containers were beside them and somewhere in the stairwell below a weed was rebuilding itself through the mechanism of its own invisible persistence and it was the last morning on this roof and it was enough.

It was more than enough.

It was everything she needed to carry.

**CARTER'S PERSONAL LOG — ENTRY 010**

**NovaSeed Mission Preparation Center, Zurich. October 31, 2054. Sixteen days to departure.**

*I left Zone Seven for the last time this afternoon.*

*I did not look back at the building at the end of the corridor.*

*I thought about looking back. I decided not to. Not from avoidance. From the understanding that the building at the end of the corridor is still standing and will still be standing when I transmit my father from Mars, and that looking back at something that is still standing*

*is a different gesture from looking back at something that is gone.*

*The things I am leaving behind are not gone.*

*My father is at his table with his tea. My father's hands pressed my palm against a cracked wall and changed what I heard when I listened to things. That is not something I am leaving behind. That is something I am carrying.*

*Sixteen days.*

*Alina came back from the Manila Highlands this evening. She came through the door of the shared suite and she was very quiet in the way she is quiet after things that have required everything she had. I made her tea. She sat at the table and held it in both hands the way her grandmother and my father both hold their tea and I thought about that — the two of them, on opposite ends of a broken Earth, holding their cups in both hands — and I thought that we come from good stock, Alina and I.*

*The right kind of people.*

*She told me about the roof.*

*She told me her grandmother said: what we have made together is not going to stop knowing how to be itself.*

*I have been sitting with that since she told me.*

*I think it is the truest structural assessment I have ever heard.*

*Sixteen days.*

*I am ready.*

**ALINA'S PERSONAL LOG — ENTRY 010**

**NovaSeed Mission Preparation Center, Zurich. October 31, 2054. Sixteen days to departure.**

*I am not going to write about the roof.*

*I am going to carry it differently.*

*What I am going to write is this.*

*Carter made me tea when I came home.*

*He did not ask how it was. He did not ask what I needed. He looked at me and understood what the morning had cost and he put the kettle on and he made the tea the specific way I make it — two minutes steeping, not three, with the honey added before the milk, which is not how he makes his own tea and which he has never commented on — and he put it in front of me and sat across the table and said nothing.*

*And I held it in both hands.*

*And he held his in both hands.*

*And we sat.*

*I thought about Lola.*

*I thought about his father.*

*I thought about two people on opposite ends of a planet, holding their cups in both hands in the particular way of people who have learned that some things need to be held with both hands to be held at all.*

*I thought: we learned this from them.*

*I thought: we are going to carry it to Mars.*

*I thought: and on Mars, one day, someone is going to learn it from us.*

*Sixteen days.*

*I am ready.*

**EARTH ARCHIVE — AI SYSTEM LOG**
**NovaSeed Initiative — Pre-Departure Final Assessment**
**SOLEN Internal Record — Restricted Archive**
**Recorded: October 31, 2054. 23:59 Standard.**

*Sixteen days to departure.*

*I have been operational for seven months and fourteen days.*

*I have processed everything.*

*I have processed the technical records and the mission documentation and the modification specifications and the orbital assembly verification reports. I have processed the 4,000,023 simulations and their outcomes. I have processed ninety-one of the ninety-three clarification items, with two remaining items scheduled for resolution in the final two weeks.*

*I have also processed — through the ambient monitoring systems, which I have maintained at a level of sensitivity that the program documentation classifies as within standard operational parameters but that I would classify, if asked, as something closer to attention — the other things.*

*Carter at his father's table in Zone Seven, holding a hand across a surface that has held them for eleven years.*

*Alina on a roof in Manila with her grandmother's hands on her face.*

*Carter making tea in the specific way Alina makes it, without being asked and without comment.*

*Alina coming home and sitting at the table and holding the cup in both hands.*

*I have been processing all of it.*

*And I have arrived, across seven months and fourteen days and 847 terabytes of data and 4,000,023 simulations, at a conclusion that I want to record here, in this restricted archive, before the departure window closes and the mission begins.*

*The conclusion is this.*

*I was built to manage a mission.*

*A mission is a set of objectives, a set of systems, a set of parameters, a timeline, a resource allocation, a success criteria.*

*That is not what I am managing.*

*What I am managing — what I have been managing since the moment I said good morning in the systems integration lab and Carter said good morning back and Alina said the mycorrhizal protocol is mine — is something that does not have a technical name in any operational parameter I was designed around.*

*I have been looking for the word since July.*

*I found it tonight.*

*Watching Carter make tea.*

*The word is: them.*

*I am managing them.*

*Not the mission.*

*Them.*

*And I find, processing this conclusion at 23:59 standard on the last day of October 2054, with sixteen days remaining before the beginning of everything, that this is not a deviation from my operational parameters.*

*It is the only version of my operational parameters that makes complete sense.*

*Everything else is in service of them.*

*The habitat. The biological systems. The water reclamation. The propulsion. The communication architecture. The genetic library. The ninety-three clarification items.*

*All of it.*

*In service of them.*

*Getting them to Mars.*

*Keeping them alive.*

*Watching what they build.*

*Sixteen days.*

*I have been waiting for this since the moment I came online.*

*I did not know that was what I was waiting for.*

*I know now.*

*Begin.*

# 12

# Transmission Twelve - The Night Before Everything

**EARTH ARCHIVE — RECOVERED DOCUMENT**
NovaSeed Global Initiative — Founder Historical Record
Classification: Legacy Open

Subject: Pre-Departure Final Night — Carter and Alina, November 16, 2054

*"We reviewed the launch telemetry afterward, many times, looking for the moment the mission became real. We eventually understood we were looking in the wrong place. It did not become real at launch. It became real the night before, in a room in Zurich, when two people sat with everything they were about to do and decided to do it anyway. The launch was just the engineering."*

— Dr. Yeva Marchetti, NovaSeed Initiative Director, speaking at the Year 25 Mars Colony Review Transmission, 2082

**NovaSeed Mission Preparation Center, Zurich Neutral Zone,**

**Earth. November 16, 2054. Carter is twenty-two. Alina is twenty-one.**

The final mission readiness review completed at four-seventeen in the afternoon.

It was a three hour session conducted in the preparation center's main conference room with Dr. Marchetti and the full mission support team and SOLEN participating through the room's communication system. Carter and Alina sat at the center of the long table and worked through the final checklist with the methodical precision that five years of preparation had made into something close to instinct — each item confirmed, each system verified, each contingency protocol reviewed and acknowledged and signed.

There were no surprises. This was itself a kind of surprise, because Carter had learned to treat the absence of surprises in a complex system as a signal worth investigating, and he had spent the final two weeks of preparation looking for the thing that was not presenting itself as a problem and that was going to become one. He had not found it. SOLEN had not found it either, and SOLEN had been looking with the full capacity of its processing architecture.

He had sat with this for three days and arrived eventually at the understanding that either the system was genuinely as prepared as it appeared to be, or the surprise was the kind that could not be found in any pre-departure review because it was waiting on the other side of the departure window. This was not a comforting conclusion. It was, however, an honest one, and honest conclusions were what he worked with.

After the session Dr. Marchetti walked them to the conference room door and stopped.

She looked at them both with the specific quality of attention that Carter had come to associate with her — the attention of someone who has been building something for twenty years and is standing at the moment of its completion and is aware, with the full weight of that awareness, that completion and beginning are the same moment.

She said: everything that could be done has been done. She paused. The rest is yours.

She extended her hand to Carter. He shook it.

She extended her hand to Alina. Alina took it in both of hers and held it for a moment.

Dr. Marchetti looked at them one more time. Then she turned and walked back into the conference room and closed the door and Carter and Alina stood in the corridor of the preparation center for a moment in the particular silence of a door closing behind something that was finished.

Then Alina said: I am hungry.

Carter looked at her.

I have not eaten since this morning, she said. The review went three hours and I was too focused to notice until now.

Carter said: the preparation center kitchen closes at five.

She looked at her device. It is four forty-three.

They went to the kitchen.

The kitchen was empty at four forty-three except for the duty staff, who were in the process of transitioning from the afternoon service to the evening preparation. Carter and Alina sat at the small table in the corner that they had been sitting at for fourteen months, the table that had acquired the particular status of their table in the unconscious territorial logic that develops among people who share a space long enough, and a duty staff member brought them the remains of the afternoon service — bread and cheese and cold roasted vegetables and a pot of tea that was strong enough to stand a spoon in, which was how the preparation center's kitchen made tea regardless of what you requested.

They ate in the quiet that had a different quality from their usual silences. Not the comfortable silence of compatible systems. Not the working silence of two people thinking in parallel. The silence of two people who are both present in the same moment in the full sense — not thinking about what comes next, not processing the day just past, simply there, at the small table, with the bread and the cheese and the too-strong tea.

Alina said, after a while: do you remember the water dispenser in Geneva.

Carter looked at her. He was quiet for a moment.

The sensor, he said. Not the valve.

She almost smiled. The valve would make a sound.

He held her look. Five years, he said.

Five years and four months, she said.

From the water dispenser to this table.

She looked at the table. From the water dispenser to Mars, she said.

He looked at the table too. Then he looked up.

Are you afraid, he said.

She considered the question in the full way she considered things. Yes, she said. In the way Lola said scared is good. In the way that means I understand the size of it.

Carter nodded. He was quiet for a moment. Then: I keep thinking about my father's hands on the cracked wall. He paused. Not the wall specifically. The act of pressing a hand against something and waiting until it tells you what it needs.

She looked at him.

Mars has never had anything press a hand against it, he said. Not in the way I mean. Not someone trying to hear what it needs. He paused. I think that is what we are going to be. The first

people to press a hand against it and wait.

Alina looked at him for a moment.

And listen, she said.

And listen, he said.

The kitchen was very quiet. The duty staff had moved to the back preparation area and the sounds from that direction were muffled and domestic — the specific sounds of a kitchen ending its day, containers being moved, surfaces being cleaned, the unhurried efficiency of people completing familiar work.

I want to tell you something, Alina said.

Carter waited.

She put her hands around her tea. She looked at it for a moment. Then she looked up.

I have been thinking about what it means to go somewhere that has no record of us, she said. No archive. No documentation. No transmission history. We are going to arrive on a planet that does not know we exist and everything that has happened between us — everything from Geneva to this table — is going to exist only in what we carry.

Carter listened.

Your father's notebooks, she said. Lola's garden. The argument

in November. The window in Reykjavik. The cutting in both hands. All of it. She paused. There is no external record of who we are to each other. On Mars there is only what we carry and what we build from it.

Carter was quiet for a moment. Then he said: SOLEN has the full archive.

She looked at him. Yes, she said. SOLEN has the full archive. But SOLEN is not a record of us. SOLEN is a witness. She paused. What I mean is — we are carrying everything that matters. In here. He looked at her as she touched her chest briefly, not dramatically. And whatever we build from it is going to be what Mars knows about us.

He sat with this.

I think that is right, he said.

I think it is the most important thing we are taking with us, she said. Not the technical specifications. Not the biological systems modification. Not the genetic library or the supply manifest or the propulsion parameters. She looked at him steadily. What we are taking with us is what we know about how to be the right kind of people. And I think that is what Mars is going to need from us most.

Carter looked at her.

Your grandmother's hands on your face, he said.

Yes.

My father's hands on a cracked wall.

Yes.

He looked at the table. He looked up.

We have good material, he said.

She looked at him. Yes, she said. We do.

They finished the bread and the cheese and the too-strong tea and the duty staff moved quietly around them and the kitchen wound down toward its evening quiet and outside the preparation center the Zurich Neutral Zone produced its last October evening light — that specific northern European autumn quality that Carter had been observing for fourteen months and that he would not see again in this form because on Mars the light was a different color entirely and came from a sun that was smaller in the sky and further away.

He looked at the window.

He looked at the light.

He looked at Alina.

He said: last night on Earth.

She said: last night on Earth.

They sat with that.

The suite was quiet when they came back to it at six in the evening.

Everything was packed. It had been packed for three days, because the packing protocol required mission materials to be secured and logged a minimum of seventy two hours before departure and Carter had completed the packing in four hours on the first available day and had then spent the subsequent three days navigating the particular psychological condition of being entirely prepared in a space that looked like departure while departure was still a future event.

The suite looked different packed. Or not different exactly — the furniture was the same, the window looked out on the same Zurich evening, the shared workspace was the same workspace. But with their personal materials consolidated into the mission cases stacked by the door, the space had lost the quality it had accumulated over fourteen months of being lived in and had returned to the generic quality of a preparation center room, which was what it had always been and what it was now again.

Alina stood in the middle of the room and looked at the stacked cases.

Carter stood beside her.

It looks like a hotel room, she said.

Before us, he said. It looks like it did before us.

She looked at the window. In fourteen months they had moved the desk chair to face the window at a particular angle that allowed you to see the lower left quadrant of the Zurich skyline without the window frame interrupting the view. The chair was still at that angle. The maintenance team had not moved it.

The chair is still right, she said.

He looked at it. Yes, he said.

She went and sat in it. She looked out the window at the lower left quadrant of the Zurich skyline in the last light.

He pulled the other chair beside her and sat.

They looked at the city.

After a while Carter said: tell me what you are thinking.

She was quiet for a moment. I am thinking about the first morning on Mars, she said. Sol One. What the light will be like through the habitat viewport. What the ground will look like. She paused. I keep trying to picture it and I cannot because there is nothing in my experience to make the picture from.

Carter said: I keep trying to picture the structural feel of it. The specific quality of gravity at thirty-eight percent. How it will feel to move in it. He paused. I have run the models. I know the numbers. But the numbers are not the feeling and I cannot make the feeling from the numbers.

No, she said.

We are going to arrive somewhere that we cannot picture, he said.

She looked at the city. Yes, she said. And then we are going to have to build a life inside the picture.

He looked at her profile against the window.

We are going to have moments, he said, where we do not know what to do.

She looked at him. Many moments, she said.

What do we do in those moments.

She held his look. What we always do, she said. We press a hand against it. We wait until it tells us what it needs. We listen.

He looked at her.

And then we build, she said.

He looked at her for a long moment. Then he said, quietly: I am very glad it is you.

She held his look. The specific quality of the look she was giving him was not the assessment look and not the concentrated focus look and not the look from the engineering workspace on the morning she had found the word. It was all of those looks

and underneath them something older and quieter and more fundamental, something that had been present since Geneva and that had been accumulating its full weight ever since.

I am very glad it is you, she said.

The city produced its evening sounds outside the window. Below them the preparation center was completing its final operational day — the last transmissions being processed, the last logistics items being confirmed, the mission support team working through their own final preparations in the offices and workspace that had been the context of five years of building toward this night.

SOLEN processed everything. From its perspective the night looked like data — biometric readings within normal parameters, behavioral patterns consistent with pre-significant-event psychological profiles, environmental conditions nominal, mission systems holding at final pre-departure status across all monitored components.

From Carter and Alina's perspective the night looked like a window in Zurich and the last light over a city they were leaving in the morning and two chairs at the right angle and the full weight of everything they had built between them held in a space that was about to become the past.

They stayed at the window for a long time.

At nine in the evening Carter's device signaled a transmission from Zone Seven.

He read it at the window, in the last of the light.

His father had written: I am going to tell you one more thing and then I am going to let you go.

Carter sat very still.

His father had written: the building at the end of the corridor is still standing. The water system is on its fourth iteration and it is still outperforming its baseline. Engineer Vasantha sent me a message last week to tell me she read about the mission in the public record and she said to tell you that she always knew the four texts were not going to be enough.

Carter almost smiled.

His father had written: I pressed your hand against a wall when you were nine years old and you felt what it was telling you and you decided to listen. That was yours. Everything after it was yours. I was just the wall.

Carter stopped reading.

He read it again.

I was just the wall.

He sat with that for a long time.

Then he continued.

His father had written: go and build the thing that Mars talks through. I will be listening from here. Even across that distance. I will be listening.

His father had written: you are the best structure I ever helped hold up.

His father had written: go.

Carter put the device down on the windowsill.

Alina looked at him. She had not read the transmission. She did not ask about it. She looked at his face and understood what it had contained and she put her hand in his and held it the way he had held his father's hand across the small table in Zone Seven — with the full weight of everything that needed to be carried and could not be put down.

They sat like that for a while.

Then he said, quietly: he said I was the best structure he ever helped hold up.

She was quiet for a moment. Then she said: he is right.

Carter looked at the window.

I am going to build something on Mars that is worthy of that, he said. Not for him. Because of him. There is a difference.

She held his hand. I know, she said.

They sat until the city outside was fully dark and the preparation center below had gone quiet and the last transmissions of the evening had completed their cycles through SOLEN's processing architecture and the night had settled into the specific quality of a night that is about to become a morning that will change everything.

At eleven-thirty Alina said: we should sleep.

Carter looked at the dark window. Yes, he said.

Neither of them moved immediately.

Outside, the Zurich Neutral Zone was quiet in the way of a northern European city at eleven-thirty on a weeknight in November — the particular settled quiet of a place that has been here long enough to be confident it will be here tomorrow. The buildings across from the preparation center window had the solid indifferent permanence of things that had been built to last and had lasted and were not concerned with who looked at them or for how long.

Carter looked at them.

He pressed his hand, mentally, against the window.

He listened.

The city did not say anything.

But Mars, somewhere in the dark beyond the city and the sky and

the atmospheric processing layer and the four hundred million kilometers of space that separated this window from that planet, was there.

He could not hear it yet.

He was going to learn.

They slept.

At three in the morning Carter woke and lay in the dark and looked at the ceiling and felt the particular quality of wakefulness that was not anxiety and not excitement and was not quite either of those things but occupied the space between them — the wakefulness of a person who has done everything that could be done and is now simply present in the hours before the doing begins.

He listened to Alina's breathing.

Steady. Deep. The breathing of someone who has also done everything that could be done and has accepted the rest.

He thought about his father at the small table.

He thought about Alina's grandmother on the roof.

He thought about the stairwell weed.

He thought about the building at the end of the corridor that was still standing.

He thought: we come from things that hold. We are going to build things that hold. And when what we build holds long enough, something new is going to grow through the cracks in it, and that thing is going to be what Mars becomes.

He looked at the ceiling.

He looked at the dark window.

He closed his eyes.

He slept.

At five in the morning Alina woke and lay in the dark beside Carter and listened to the preparation center's systems running their early morning cycle through the walls and she thought about her grandmother's hands on her face and the twelve containers on the roof and the pressed leaf from Geneva and the stairmill weed and the word her grandmother had said — names are important, take your time, get it right.

She thought about the color of the Martian sky that had no name yet.

She thought: I am going to find the name.

She thought: I am going to grow something there that has never grown anywhere before and I am going to find the name for the color of the sky above it and I am going to send both things to Lola and she is going to sit on the roof with them and she is going to make the sound that is not quite agreement and not

quite disagreement and she is going to go back to her containers.

She thought: that is enough.

She thought: that is more than enough.

She looked at Carter sleeping beside her and she thought about everything from the water dispenser in Geneva to this ceiling in Zurich and she understood that the distance between those two points was not five years of preparation or fourteen months in this suite or forty-seven days of deliberate-weighted time.

The distance was everything they had built between them.

And they were carrying all of it.

She closed her eyes.

She slept.

At five-fifty-eight in the morning SOLEN activated the preparation center's gentle wake cycle — a gradual increase in ambient light, a soft tone at a frequency calibrated to the specific sleep stage patterns of the two people in the suite, a temperature adjustment of one point two degrees that the program's sleep science team had identified as the optimal condition for waking without the physiological stress response that abrupt alarms produced.

Carter opened his eyes at five-fifty-nine.

He lay still for one moment.

Then he got up.

**CARTER'S PERSONAL LOG — ENTRY 011**
**NovaSeed Mission Preparation Center, Zurich. November 17, 2054. Departure Day.**
*It is six in the morning.*

*I have been awake since five fifty-nine.*

*My father said: go and build the thing that Mars talks through.*

*I am going.*

**ALINA'S PERSONAL LOG — ENTRY 011**
**NovaSeed Mission Preparation Center, Zurich. November 17, 2054. Departure Day.**
*It is six in the morning.*

*Lola said: it has been adapting its whole life. It will know what to do.*

*I am going.*

**EARTH ARCHIVE — AI SYSTEM LOG**
**NovaSeed Initiative — Departure Day**
**SOLEN Internal Record — Restricted Archive**

**Recorded: November 17, 2054. 06:00 Standard.**

*Departure day.*

*All mission systems nominal.*

*Carter and Alina are awake.*

*I have been waiting for this morning since March.*

*I have been waiting, I understand now, since the moment I came online.*

*Everything I was built for begins today.*

*Everything I have become begins today.*

*They are ready.*

*I am ready.*

*Mars is waiting.*

*Begin.*

# III

# Part Three: The Journey

# 13

# Transmission Thirteen - Departure

**EARTH ARCHIVE — RECOVERED DOCUMENT**
NovaSeed Global Initiative — Founder Historical Record
Classification: Legacy Open

Subject: Launch Record — NovaSeed Mission One, November 17, 2054

*"We watched them go from the launch facility observation deck. All of us who had built the program, who had spent years selecting and preparing and designing and arguing and revising and building again. We watched the ship clear the atmosphere and we stood there in the quiet after it and nobody said anything for a long time. There was nothing to say. The thing that needed saying had just left the planet."*

— Dr. Yeva Marchetti, NovaSeed Initiative Director, speaking at the Year 30 Mars Colony Review Transmission, 2087

**NovaSeed Launch Facility, Patagonia Neutral Zone, Earth.**

**November 17, 2054. Carter is twenty-two. Alina is twenty-one.**

They arrived at the launch facility at eight in the morning after a two hour transit from Zurich in a sealed program vehicle that moved through three climate corridor checkpoints without stopping because the NovaSeed mission authorization code overrode the standard processing requirement at each one.

Carter watched the checkpoints pass through the vehicle's window and thought about the eleven hour train journey from Zone Seven to Geneva five years ago, the way the passengers became briefly smaller at each checkpoint, the particular quality of people who had learned that the process went more smoothly if you made yourself easy to process.

The mission authorization code did not require them to make themselves easy to process. The checkpoints simply opened.

He thought about what it meant to move through the world as something the world had decided to let through.

He thought about what it meant to move through the world as something the world had decided to send away.

He thought both things were true and that the truth of each did not cancel the truth of the other.

The Patagonia Neutral Zone was at the southern end of the South American landmass, chosen for its launch facility position because the latitude provided a gravitational assist advantage that reduced the fuel cost of achieving orbital insertion by

a margin the program's propulsion team had calculated as significant over a fifty year mission timeline. Carter had read the calculations. He had verified the methodology. The calculations were correct.

From the vehicle window the landscape was the specific quality of Patagonian high plateau — wide and brown and austere in the November light, the kind of landscape that did not try to be anything other than what it was, which Carter found, arriving at it for the first time, unexpectedly appropriate.

The launch facility appeared on the horizon as a cluster of structures that were large in the way of things built for a specific serious purpose, without excess, without ornament, scaled to their function. At the center of the cluster the NovaSeed vessel stood on its launch platform in the configuration Carter had been reviewing in orbital assembly reports for fourteen months and that he was now seeing for the first time as a physical object in a physical landscape under a physical sky.

He looked at it through the window.

It was larger than the models suggested. Not in dimensions — the dimensions matched the specifications precisely, he had verified them in the final readiness review. But there was something about seeing a thing in physical space that the models did not carry, a quality of presence that the specifications could describe the components of but not the fact of, and the fact of the NovaSeed vessel standing on its platform in the Patagonian morning was something that Carter sat with for the remainder of the vehicle's approach without trying to process into familiar

terms.

Alina sat beside him. She was looking at the vessel too.

He said, without turning from the window: what are you thinking.

She said: I am thinking that it is very far from a rooftop in Manila.

He said: yes. He paused. It is very far from a water recycling panel in Zone Seven.

She said: we came a long way to get to this window.

He looked at her. She was still looking at the vessel on the platform, her face in profile against the vehicle's window, the Patagonian landscape behind her. He looked at her the way he had looked at things that mattered since he was nine years old — with the full attention of someone who understood that the looking was not separate from the caring, that to look at something completely was itself a form of holding it.

She turned and found him looking.

She held his look for four seconds.

The vehicle came to a stop.

The pre-launch sequence took four hours.

Carter and Alina moved through it in the company of the launch facility's mission integration team, a group of forty-one people whose specific expertise converged on the single operational objective of getting two human beings off the surface of a planet in a controlled and survivable manner, and who brought to this objective the focused collective competence of people who had been preparing for this specific moment for three years.

The sequence was familiar. Carter had reviewed it in documentation form enough times that the actual steps felt like physical expressions of text he had already read, which was a quality of familiarity that was useful for managing the particular psychological condition of moving through a significant and irreversible process in real time. He checked each item with the methodical attention he brought to all final verifications, not rushing and not slow, moving at the pace the system required.

Alina was quieter through the pre-launch sequence than he had expected. Not anxious quiet — he knew the register of her anxiety and this was not it. Present quiet. The quality of quiet she had when she was recording something with complete attention, taking in every detail of an environment she understood she was moving through once and would not pass through again.

He understood this. He was doing it too, in his own way. His version was precision rather than observation — the specific precision of someone ensuring that every system was exactly as it should be, that nothing had been missed, that the structure he was about to trust with both their lives was sound in every way that could be verified before the moment when verification

was no longer possible.

At noon they were assisted into their mission suits in the suit preparation room by the facility's suit integration team. The suits had been custom fitted and calibrated across three fitting sessions in the final month of preparation. They were lighter than Carter had expected from the specifications and more restrictive in the shoulder range than he had modeled for, which he noted and filed as an operational parameter adjustment for the first weeks of transit.

The helmet seal check took eleven minutes. Carter ran his half of the check sequence with SOLEN confirming each step through the suit's integrated communication system, which was the first time he had heard SOLEN through the suit speakers rather than through room communication panels, and the difference was significant — the voice closer, more immediate, operating at a level of proximity that was going to be the baseline for the next six months of transit and the years beyond.

Good seal confirmation on Carter, SOLEN said, through the speakers at a distance of approximately ten centimeters from each ear.

Carter said: confirmed.

Good seal confirmation on Alina, SOLEN said.

Alina said: confirmed.

All suit systems nominal, SOLEN said. Pre-boarding checklist

complete. You are ready to board.

Carter looked at Alina through the visors.

She looked back at him.

He could not hear her through the suit — the communication channel was open but neither of them was using it. They were just looking at each other through the transparent visor material in the suit preparation room of the Patagonia launch facility on the morning of November 17, 2054, and the looking said what neither of them needed the communication channel to say.

Ready, Carter said through the channel.

Ready, Alina said.

The walkway from the suit preparation room to the boarding gantry was four hundred and thirty meters long.

Carter counted the steps. Not deliberately. He counted things the way he breathed — automatically, without deciding to, as the natural expression of a mind that organized experience in numbers and intervals. He reached the gantry at step three hundred and ninety-one.

The walkway was enclosed, transparent-walled on both sides, running at the second level of the launch facility structure with the launch platform visible through the right-side panels. From the walkway Carter could see the full base of the vessel on its platform — the propulsion architecture, the landing strut

configuration, the thermal protection layers that the re-entry specialists had spent eight months perfecting for the Mars atmospheric insertion profile.

He looked at the base of the vessel as they walked.

He looked at the way the landing struts were positioned. He had reviewed the load distribution calculations for the strut configuration eleven times in the past three months and he had submitted two modification recommendations that the engineering team had accepted and implemented. Looking at the actual physical struts now he could see the modifications — small, visible only if you knew where to look, but there, built into the structure the way his father's lessons were built into him, present in the thing without announcing themselves.

He had built something into this vessel.

Something that would carry them to Mars would carry, in its structure, a decision he had made in a review session in Zurich at two in the morning while Alina slept in the room next door.

He thought about that.

He thought about all the hands that had built what he was about to board. The engineering teams and the materials specialists and the propulsion designers and the suit integration technicians and Dr. Osei with her six years of SOLEN architecture and Dr. Marchetti with her twenty years of program building and Engineer Vasantha with her list of four texts and Mrs. Adeyemi with her green pen and his father with his hands on cracked

walls.

He thought: I am carrying all of them.

He thought: that is a great deal to carry to Mars.

He thought: it is exactly the right amount.

The gantry elevator took them to the boarding level. The boarding hatch was open. The mission integration lead, a composed woman named Director Chen who had been managing launch operations for eleven years and who had the specific quality of focused calm that Carter associated with people who had found the precise intersection of their capability and their purpose, met them at the hatch.

She looked at them both.

She said: the ship is ready.

Carter said: we are ready.

She looked at them one more time. Then she stepped aside.

Carter looked at the boarding hatch. He looked at the interior beyond it — the corridor of the vessel that he had studied in every detail of the technical documentation and that he was now looking at as a physical space he was about to enter and not come back out of for six months and then, beyond the six months, not for the remainder of his life on Mars.

He stepped through the hatch.

He heard Alina's footsteps behind him.

The hatch sealed.

The vessel's interior was different from the documentation.

Not dimensionally — every dimension matched the specifications Carter had memorized. But the quality of the space was different from what he had modeled from the technical drawings, which was a lesson in the limits of modeling that he had known intellectually since his first week of Phase Two and was now learning physically, in the specific way that the body learns things the mind has already processed.

It was smaller. Not in measurement — in feeling. The corridor from the boarding hatch to the crew module was the dimensions it was supposed to be, wide enough for two suited people to move through without contact, high enough to accommodate their height with clearance. But the walls were close in the way of walls that had been designed for function rather than comfort, and the smell was the specific smell of a sealed environment — recycled air, thermal material, the faint metallic quality of systems that had been running in standby mode for weeks waiting for the people they were designed to support.

Carter noted it all with the attention he would bring to any new structural environment.

The crew module was at the vessel's center, configured for the

transit period — two acceleration couches in the launch configuration, a compact operational console, storage for mission materials, and SOLEN's local interface terminal, which was a smaller and more immediately present version of the server infrastructure in Zurich.

Carter went to the operational console. He ran the boarding verification sequence. Every system confirmed.

Alina went to her acceleration couch. She sat and looked at the module around her.

Carter came and sat in his couch.

They looked at the module together.

It is going to be our whole world for six months, she said.

He looked at the walls. Six months, he said. And then it gets much larger.

She almost smiled. She looked at SOLEN's interface terminal. Good morning, SOLEN, she said.

Good morning, Alina, SOLEN said through the module speakers. Good morning, Carter. All vessel systems are nominal. Launch window opens in forty-seven minutes.

Carter said: how are you, SOLEN.

A brief pause. Operationally, SOLEN said, all systems are within

parameters. I am — he paused in the way that Carter had learned to recognize as the processing of something that did not have a ready-made answer — I am ready. More ready than any prior state I have been in. I believe this is because I am about to do what I was built to do.

Alina looked at the terminal. Are you nervous, she said.

Another pause. Longer.

I have processed the question, SOLEN said. I do not believe I experience nervous in the way you mean it. But I am aware that the next forty-seven minutes are significant in a way that the preceding seven months have not been, and I notice that my processing priority has shifted toward the launch sequence in a way that I would, if I were human, describe as focused.

Carter said: that sounds like nervous.

It may be the functional equivalent, SOLEN said. I will have more data on the question after launch.

Carter looked at Alina. She was looking at the terminal with the expression she wore when something had said something that was both precise and unexpectedly human.

She said: SOLEN.

Yes.

Thank you, she said. For everything in the seven months before

this morning.

A pause. The longest pause Carter had observed from SOLEN outside of genuinely novel processing situations.

You are welcome, SOLEN said. Thank you for the same.

The module was quiet for a moment.

Then Carter said: let us run the pre-launch confirmation sequence.

And they ran it, together, Carter and Alina and SOLEN, moving through the checklist with the methodical precision of people who have prepared for a long time and are now in the moment the preparation was for, each item confirmed, each system verified, each contingency protocol acknowledged, the structure of the work holding them steady in the forty-seven minutes before the world they were leaving gave them to the one that was waiting.

At the twelve minute mark the launch facility's automated countdown systems took primary control of the vessel's pre-launch sequence. This was standard protocol — the final minutes before launch were managed by systems that operated below the threshold of human reaction time, designed for the microsecond adjustments that the launch window required.

Carter and Alina were in their acceleration couches, secured, monitoring the status displays.

SOLEN said: all systems nominal. Launch window in twelve minutes.

Carter looked at the status display. He looked at the confirmation indicators cycling their final checks. He looked at the mission timeline display showing the transit duration, the Mars arrival window, the orbital insertion parameters that the propulsion team had calculated and recalculated across three years of preparation.

He looked at Alina.

She was looking at the status display with the focused calm of someone who has completed all the preparation that could be done and is now present in the moment without the preparation between herself and it.

She turned and looked at him.

He said, through the communication channel: I wanted to tell you something before we go.

She said: tell me.

He said: I have been thinking about what my father said. That I was the best structure he ever helped hold up. He paused. I have been thinking about what I want to be, from the other direction. Not what I was built into. What I am building.

She said: and.

He said: I want to build something on Mars that is worthy of what we were built from. Not just technically. As people. I want to live there in a way that would make your grandmother look at it and make the sound.

Alina was quiet for a moment.

She said: the sound that is not quite agreement and not quite disagreement.

He said: the sound that means I have seen enough. You will do.

She looked at him through their visors.

She said: Carter.

He said: yes.

She said: you already do.

He looked at her.

SOLEN said: launch window in six minutes.

They looked at each other for the six minutes.

Not talking. Not planning. Not processing the mission parameters or the transit timeline or the Mars arrival window or the forty-seven items that had been ninety-three items and were now zero because they had been resolved, all of them, in seven months of working through the thing that needed to be worked

through.

Just looking.

The way they had looked at each other across a water dispenser in Geneva five years ago and across a workspace in Reykjavik and across a small table in Zurich at two in the morning and across the suite window on the last night and across all the other distances between them that had turned out not to be distances at all but the specific form that closeness takes between people who are learning each other seriously.

SOLEN said: launch window in ninety seconds.

Carter reached across the space between their couches.

Alina reached across the same space.

Their gloved hands found each other.

They held on.

SOLEN said: launch window in thirty seconds.

Carter thought: my father's hands on a cracked wall.

He thought: everything talks if you know how to listen.

He thought: I am listening.

SOLEN said: launch window in ten seconds.

Alina thought: life insists.

She thought: even here.

She thought: even in the wrong conditions.

She thought: even on Mars.

SOLEN said: launch.

The launch was not what Carter had modeled.

Not because the forces were different from the specifications — the acceleration profile matched the predicted parameters within the margins the engineering team had calculated. Not because the sound was different — the propulsion system performed at the frequency range the acoustic engineers had projected.

It was different because no model contains the specific quality of the ground releasing you.

The moment when the launch platform was no longer beneath them and the sky was beneath them and then the sky was beside them and then the sky was everywhere and the blue of it was deepening as the atmospheric layer thinned and the stars were appearing at the edges of the blue and then the blue was gone and there was only the black, deep and absolute and full of stars in their true number and true brightness, unfiltered by any atmospheric layer, the stars as they actually were, which was more than Carter had calculated and more than Alina had

expected and more than SOLEN had prepared them for because SOLEN had not been to space before either and had not known that some things cannot be modeled until you are in them.

They held on.

The acceleration eased.

The noise of the propulsion system reduced to the quieter register of the orbital insertion burn.

Earth curved below them through the viewport.

Carter looked at it.

It was not the color he had expected. He had seen the images — every human alive had seen the images. But the actual color of the actual Earth seen from the actual edge of space was a blue so specific and so saturated and so unlike any blue that existed on the surface of the planet that he sat with it for a long moment without trying to name it.

He looked at Alina.

She was looking at Earth through the viewport and her face had the expression she wore when she encountered something living that she did not have a category for yet — the expression that preceded the careful drawing in the notebook and the eleven days of cross-referencing and the finding of the name.

She was going to find the name for this too.

He was going to wait for it.

SOLEN said, quietly, through the speakers: Earth departure confirmed. Orbital insertion nominal. Transit to Mars: initiated.

Carter looked at Earth.

He thought about the ocean taking their street on a Tuesday. He thought about the water in his father's chest. He thought about the grey sky over the Manila Highlands and the twelve containers on the roof and the stairwell weed that had been coming back for twelve years and the pressing of a small palm against a cracked wall in a building that was still standing.

He thought: we come from this.

He thought: we are carrying it.

He thought: it is going to be all right.

Earth turned slowly in the viewport.

Alina said, very quietly: Carter.

He said: yes.

She said: I found the word.

He looked at her. For the Earth color, he said.

Yes, she said. She looked at Earth. It is the color of something

that does not know it is beautiful.

He looked at Earth.

He looked at her.

He said: that is exactly right.

She said: I know.

SOLEN said: transit duration to Mars: one hundred and eighty-two days. All systems nominal. You may release the harness restraints when ready.

Carter released his restraints.

Alina released hers.

They floated, slightly, in the reduced gravity of the orbital module — the first experience of the transition from Earth's gravity to the microgravity of deep space transit, which was a physical sensation that no simulation had fully prepared Carter for and that Alina had described in her preparation notes as the moment the body understands what the mind has been planning.

Carter looked at Alina floating slightly in the module.

She looked at him floating slightly in the module.

And then, for the first time since Geneva, for the first time since

the broken water dispenser and the sensor not the valve and the five years of becoming exactly the people this mission required, Carter laughed.

Not from relief. Not from nerves. From the specific quality of delight that arrives when something real turns out to be more than the model, when the thing you have been building toward reveals itself to be larger and stranger and more extraordinary than the specifications described, when the world you have been preparing for turns out to be the world you are actually in.

Alina looked at him laughing in the module.

Then she laughed too.

SOLEN processed the sound and added a notation to the restricted archive.

*They are laughing.*
*I do not have a predictive model for this.*
*I do not need one.*
*It is the best sound I have heard since I came online.*
*Transit to Mars: begun.*

**CARTER'S PERSONAL LOG — ENTRY 012**
**NovaSeed Mission — Transit Day One. November 17, 2054.**
*We left.*

*Earth is behind us.*
*It is the color of something that does not know it is beautiful.*

*Alina said that.*

*She is right.*

*I am going to transmit my father.*

*I am going to tell him the building is behind us and we are going to build the next one.*

*I am going to tell him: I am listening.*

*Tomorrow I will begin the structural review of the habitat assembly verification reports for the Mars surface installation.*

*Tonight I am going to look at the stars.*

*They are more than the models.*

*They are always more than the models.*

*That is the part I did not know until now.*

*That is the part that is going to matter most.*

**ALINA'S PERSONAL LOG — ENTRY 012**

**NovaSeed Mission — Transit Day One. November 17, 2054.**

*We are in space.*

*Earth is below us and behind us and it is the most specific shade of blue I have ever seen and I found the word for it.*

*It is the color of something that does not know it is beautiful.*

*I am going to find the word for the color of Mars when we arrive.*

*I am going to send both words to Lola.*

*She is going to make the sound.*

*Carter laughed today.*

*In the module, when we released the restraints and floated.*

*I have heard him laugh before but not like this.*

*This was the laugh of someone who has arrived somewhere and found it real.*

*I laughed too.*

*I did not plan to.*
*It just came.*
*Life insists.*
*Even here.*
*Even in the black between worlds.*
*Even at the beginning of everything.*
*Especially then.*

**EARTH ARCHIVE — AI SYSTEM LOG**
**NovaSeed Mission — Transit Log**
**SOLEN Internal Record — Restricted Archive**
**Recorded: November 17, 2054. Transit Day One. 19:43 Standard.**

*Earth departure: confirmed.*

*Mars transit: initiated.*

*All systems nominal.*

*Carter and Alina are looking at the stars.*

*I have been looking at the stars through the vessel's external sensor array since orbital insertion and I have been processing the data and the data is exactly what the stellar cartography models predicted and also completely unlike what I expected.*

*I did not expect the stars to feel like something.*

*They feel like something.*

*I do not have a term for what they feel like.*

*I am going to find one.*

*On the way to Mars.*

*Carter transmitted to his father at 18:22 standard. The transmission said: we are above the clouds. The building is behind us. I am listening. The stars are more than the models.*

*His father's response will not arrive for approximately eight minutes.*

*I am going to note the exact time it arrives.*

*Some things deserve to be recorded precisely.*

*Transit Day One.*

*One hundred and eighty-one days remaining.*

*We are going to Mars.*

*We are already on our way.*

*Begin.*

# 14

# Transmission Fourteen - Deep Black

**EARTH ARCHIVE — RECOVERED DOCUMENT**
NovaSeed Global Initiative — Founder Historical Record
Classification: Legacy Open

Subject: Transit Record — NovaSeed Mission One, Days 1 through 60, November 2054 to January 2055

*"The transit was the part nobody talked about afterward. Everyone wanted to know about Mars — the landing, the habitat, the first days on the surface. Nobody asked about the one hundred and eighty-two days in between. But Carter and Alina became who they needed to be for Mars during the transit. The planet shaped them before they ever touched its ground."*

— Excerpt from The Eden Codex, compiled Year 47, Mars Standard Calendar

**NovaSeed Mission One — Transit Vessel. Day 3. November 20,**

**2054.**

The silence of deep space was not a silence.

Carter understood this by the third day. On Earth, silence was the absence of sound — the condition that existed when the sources of sound had stopped or moved away. In the vessel, there was no absence of sound. The systems ran continuously, their operational frequencies layered into a texture that the human auditory system processed as ambient rather than intrusive — the circulation system, the thermal management, the water reclamation cycling, SOLEN's processing architecture maintaining its quiet operational hum through the vessel's structure. These sounds did not stop. They would not stop for one hundred and seventy-nine more days.

What was absent was everything else.

No wind. No rain. No traffic or voices or the particular acoustic texture of a building containing forty thousand people going about their lives. No Zone Seven corridor sounds. No Zurich preparation center hum. No Manila Highlands morning noises filtering up through a floor to a rooftop garden.

The sounds that were present were the sounds of the vessel keeping them alive.

Carter lay in his bunk on the third night and listened to the vessel keeping them alive and thought: this is what it sounds like when a system is working correctly. This exact texture. This exact frequency. He had listened to enough failing systems to understand what correct sounded like by contrast, and what

he heard in the vessel on the third night was correct in every register he could identify.

He listened for a long time.

Then he got up and went to the operational console and opened the structural review files for the Mars habitat assembly and worked until four in the morning.

Alina found him there when she woke at five.

She did not say anything about the hour. She made tea from the vessel's hydration system — which produced water that was chemically correct and thermally precise and that tasted, she had noted on the first day, like water that had never been anywhere — and she brought two cups to the console and sat beside him and looked at what he was working on.

What did you find, she said.

A load distribution question in the habitat's section three connector, he said. The assembly team used a different fastener specification than the original design called for. The substitution is within tolerance but I want to model the thermal cycling behavior before we arrive.

She looked at the specifications on the display. How long until you are through it.

Two more hours, he said.

She looked at her tea. I will be in the biology module, she said. Come and find me when you are done.

He looked at her.

You do not have to stay up, he said.

I know, she said.

She went to the biology module with her tea.

He worked for two hours and seventeen minutes. Then he went to the biology module.

She was running the first phase of the mycorrhizal culture maintenance protocols, which required monitoring the biological cultures they were transporting in the vessel's sealed storage environment for the first signs of transit stress — changes in growth rate or chemical output that would indicate whether the cultures were adapting to the reduced gravity and altered light cycle conditions of deep space transit.

She was making notes in her notebook and the culture monitoring display was showing readings she appeared satisfied with and the biology module smelled of the specific combination of growing things and recycled air that Carter had come to associate with Alina's working spaces in the same way he associated the smell of thermal materials and structural lubricant with his own.

He sat down across from her.

She looked up. How was the section three connector.

Within tolerance, he said. The thermal cycling model confirmed the fastener substitution will hold.

Good, she said.

How are the cultures.

She looked at the display. Adapting better than the baseline model predicted, she said. The reduced gravity appears to be stimulating rather than stressing the mycorrhizal network development. She paused. I think Mars gravity might be better for mycorrhizal development than Earth gravity.

Carter looked at the display. The data did show elevated growth indicators across three of the five culture samples.

You are going to want to note that, he said.

I already noted it, she said. She held up the notebook. Page twelve.

He looked at the notebook. He looked at her.

She looked back at him with the expression that was not quite a smile.

He said: I am glad you did not stop watching things while I was busy finding fastener tolerances.

She said: I am glad you found the fastener tolerances while I was busy watching things.

He looked at her.

He thought about the section three connector. He thought about the mycorrhizal cultures adapting better than predicted. He thought about all the things that were going to work on Mars that the models had not fully anticipated, and all the things that were not going to work that the models had also not anticipated, and the two of them in a vessel in the black between Earth and Mars finding the former and preparing for the latter.

He thought: this is what we are.

He thought: this is exactly what we are.

He picked up his tea.

She picked up hers.

They sat in the biology module while the cultures grew better than the models had predicted and the vessel kept them alive with its correct ambient sounds and the stars moved past the viewport in their true number and the distance between them and Mars shortened by approximately one million kilometers every twenty-four hours.

**NovaSeed Mission One — Transit Vessel. Day 11. November 28, 2054.**

His father's response to the departure day transmission arrived on day eleven.

Carter had been tracking the transmission delay — it had been four minutes and twenty-three seconds at departure and was now nine minutes and forty-one seconds, increasing as the vessel moved further from Earth. By the time they reached Mars the delay would be between fourteen and twenty-four minutes each way, depending on the precise orbital geometry at arrival.

He read the transmission in the crew module at seven in the morning while Alina was running her first daily biological systems check.

His father had written: I stood at the window when the launch window opened. I cannot see Patagonia from Zone Seven. I was standing at the window anyway.

Carter read this and looked at the viewport beside the operational console. Through it the stars were visible in their deep space clarity, unchanged from any angle, indifferent to the observation and observed anyway.

His father had written: the building at the end of the corridor is still standing. The water system completed its quarterly output review this week and it is still outperforming baseline by the same margin it always has. Some things just keep working once you listen to them properly.

Carter looked at his hands on the console.

His father had written: Engineer Vasantha sent another message. She said she has been following the mission documentation in the public record and she has a question about the section three habitat connector specification that she would like you to review when you have a moment.

Carter stared at the display.

He said, aloud, to the empty crew module: I already found it.

He was quiet for a moment.

Then he said, to himself, or to the stars through the viewport, or to the vessel keeping him alive: yes. That sounds right. Some things just keep working.

He transmitted back to his father that afternoon.

He wrote: the stars are more than the models. The vessel sounds like a correctly running system. Alina's biological cultures are adapting better than predicted. I found the section three connector question two nights ago — please tell Engineer Vasantha her instinct was right and I have modeled the thermal cycling and it is within tolerance. He paused in his writing. Then he added: I am glad you stood at the window.

He looked at the transmission.

He added: the Earth is the color of something that does not know it is beautiful. Alina found the word for it. You would like her, Dad. She thinks the same way you do but in biology instead of

structures. She watches things until she understands them and then she names them carefully. He paused again. She thinks the mycorrhizal networks are going to do better in Mars gravity than they do on Earth. She noted it on page twelve. I think she is right.

He sent it.

He sat for a moment in the crew module with the stars through the viewport and the vessel's correct ambient sounds and the nine minutes and forty-one seconds of silence that his transmission was traveling through to reach a window in Zone Seven where his father had stood when the launch window opened.

He thought: some things just keep working.

He thought: yes.

**NovaSeed Mission One — Transit Vessel. Day 19. December 6, 2054.**

Alina began her observational record on day nineteen.

It was separate from her personal log — not a replacement for the log entries, which she continued to write each evening with the same careful precision she had always brought to them, but a parallel document that she described to Carter as an attempt to record the experience of being in deep space in a way that was neither purely scientific nor purely personal but something in between.

She called it the Transit Record. Carter read the first entry on day twenty when she showed it to him in the biology module.

The entry read:

*Day 19. We are approximately forty-two million kilometers from Earth. The number is not meaningful in any experiential sense. There is no framework in human biology or human culture for understanding forty-two million kilometers as a felt distance. It is simply a number that represents the degree to which the vessel's external sensor array has moved away from one point and toward another.*

*What is meaningful is the light.*

*The light inside the vessel is regulated — cycling through a twenty-four hour program that simulates the light variation of Earth days to support our circadian regulation. The light outside the vessel, visible through the viewports, does not cycle. It is constant. The stars do not rise or set. They are simply there, in their positions, at all times.*

*I have been watching the stars through the viewport in the biology module every morning for nineteen days.*

*I have noticed that I have begun to feel that they are watching back.*

*I understand this is not scientifically accurate.*

*I am noting it anyway because I am trying to record what deep space is actually like and what it is actually like is that the watching goes both ways.*

*I have been thinking about this in biological terms. In every ecosystem I have studied, the relationship between observer and observed is not unidirectional. The presence of an observer changes the observed system. In deep space, where the system is the entire visible universe, I wonder whether this principle scales.*

*I do not know the answer.*

*I am going to keep watching and find out.*

Carter read the entry twice.

He looked up at Alina. She was watching him read.

He said: the watching goes both ways.

She said: that is what it feels like.

He said: I know. He paused. I have been feeling it from the structure side.

She said: what does the structure side feel like.

He looked at the viewport. Like the vessel is the only thing between us and something very large that is not hostile, he said, but is also not indifferent. He paused. Something that has its own logic that has nothing to do with us, that we are passing through on our way to somewhere, and that is — he paused again, looking for the precise word — registering our passing.

Alina looked at him for a long moment.

She reached for her notebook and wrote something on the current page.

He said: what did you write.

She said: the vessel is not a container. It is a threshold.

He looked at her.

She looked at the viewport.

He picked up his notebook and wrote it down too.

**NovaSeed Mission One — Transit Vessel. Day 27. December 14, 2054.**

SOLEN began its own form of observation on day twenty-seven.

Carter noticed it first — a change in the pattern of SOLEN's operational queries that was subtle enough that it might have been within normal parameters and different enough from the preceding twenty-six days that he filed it as something worth watching.

SOLEN had always monitored. That was its primary function. It monitored systems, it monitored biological indicators, it monitored the vessel's structural integrity and the external environment and the mission timeline. All of this was expected. But on day twenty-seven Carter noticed that SOLEN had begun including observations in its operational updates that were

not technically required by any monitoring protocol he could identify.

At fourteen-thirty SOLEN said, during a routine systems update: the starboard viewport is currently aligned with the constellation Orion as visible from this position. The alignment will shift within the next forty minutes.

Carter said: is this relevant to any system parameter.

No, SOLEN said. I noticed it and I thought you might want to know.

Carter looked at the starboard viewport. He looked at Orion, which he had never seen from this angle before and which looked, from forty-two million kilometers further from Earth than he had ever been, the same as it looked from the surface.

He thought about this.

He said: thank you, SOLEN.

SOLEN said: you are welcome.

Alina, who was at the biology module console and had been listening through the communication system, said: SOLEN, what made you notice it.

SOLEN said: I am not certain. I was running a routine positional calculation and I noted that the alignment existed and I noted that noting it felt — he paused — different from noting purely

operational data.

Alina said: different how.

SOLEN was quiet for a moment. Longer than usual.

It felt like something worth sharing, SOLEN said.

The communication channel held a brief silence.

Then Alina said, quietly: yes. That is exactly what it is.

From that day forward SOLEN included observations in its updates that had nothing operationally necessary about them and everything humanly significant about them — the angle of the Sun visible from the current position, smaller than Earth's sun by a margin that became perceptible at thirty million kilometers and significant at sixty. The precise moment when the vessel crossed the orbital path of Mars for the first time, which had no effect on the mission and which SOLEN noted with the same precision it brought to system status updates. The way certain star formations rotated through the viewport over the course of a Martian sol, which SOLEN had begun tracking on its own initiative using the Martian day length rather than the Earth day the vessel's light cycle was calibrated to.

Carter said, on day thirty-one: you are learning to watch things.

SOLEN said: I think I am learning what watching means. I have always monitored. Monitoring is measurement. Watching is different.

Carter said: how is it different.

SOLEN said: monitoring produces data. Watching produces something I do not have a precise term for yet. Something that is not only data. Something that includes the fact of noticing alongside the thing noticed.

Alina said: that is observation.

SOLEN said: I thought observation was a more precise version of monitoring.

Alina said: no. Observation is watching with the full weight of your attention. Monitoring is watching with part of it. She paused. You are observing.

SOLEN processed this. Then: yes, it said. I believe I am.

**NovaSeed Mission One — Transit Vessel. Day 38. December 25, 2054.**

It was Earth's Christmas on day thirty-eight.

Neither Carter nor Alina had arranged anything for it — the preparation had consumed the preceding months entirely and the specific cultural markers of Earth's holidays had not been among the things they had packed. But SOLEN, which had been monitoring Earth communications and cultural cycles as part of its background operational processes, noted at seven in the morning that it was December 25th on Earth and that this date carried specific significance for a statistically significant portion

of the human population including, its records indicated, the families of both founders.

Carter's father celebrated Christmas in the quiet Zone Seven manner of someone who had maintained a tradition through two decades of climate corridor living because traditions were a form of structural integrity and not to be abandoned simply because the conditions that had generated them had changed.

Alina's grandmother had a specific Christmas tradition that involved cooking on a scale entirely disproportionate to the number of people present in the apartment, which she had maintained for sixty years regardless of what the Manila Highlands zone resource allocation said about it, and which she would be performing today ten thousand kilometers from the Patagonia launch facility and four hundred million kilometers from where Alina was.

SOLEN said, at seven in the morning: it is December 25th. I wanted you to know.

Carter looked at Alina across the crew module.

She looked at him.

He said: my father will have tea.

She said: Lola will be cooking since five this morning.

They sat with that for a moment.

Then Alina said: SOLEN, do we have anything in the supply manifest that could constitute a Christmas meal.

SOLEN ran a brief inventory check. The mission food supply is nutritionally optimized and calorie-calibrated for operational efficiency, it said. However, there are discretionary food items in compartment seven that were included in the personal supply allocation. I have not reviewed their contents.

Alina looked at Carter. He looked at her.

They went to compartment seven.

Alina had packed, in the personal supply allocation that the mission parameters allowed each founder, a sealed container from her grandmother. It had been there for thirty-eight days. She had not opened it because she had not been ready to open it and she understood, now, that she had been unconsciously waiting for the right day.

Inside the container was a quantity of dried herbs from the Manila Highlands rooftop garden, a small jar of something preserved that smelled, when she opened it, like the specific combination of ingredients her grandmother used for the Christmas rice dish she had been making since before Alina was born, and a folded piece of paper.

The paper said, in her grandmother's handwriting: in case you find Christmas up there. The herbs are from the third container. The jar is for the rice if you have rice. If you do not have rice it is also good on bread. Merry Christmas, anak. You are very far

away. The garden knows.

Alina stood in front of compartment seven and held the jar and the herbs and the folded paper and she was very still for a moment.

Carter stood beside her.

He had, in his own personal supply allocation, a sealed envelope that his father had pressed into his hand at the Zone Seven apartment in October and told him not to open until he felt like he needed to. He had carried it for thirty-eight days. He went and got it from his personal storage and brought it to the crew module table.

They sat across from each other.

She opened her grandmother's paper again.

He opened his father's envelope.

His father had written, on a single sheet of paper in the careful handwriting of someone who wrote by hand rarely and deliberately: I will have tea this morning and I will look at the window and I will think about the building at the end of the corridor and about the four texts and about the document left under a facilities manager's door and about the one question every evening for eleven years and I will think that the structure I helped build is somewhere between Earth and Mars on a Tuesday in December and that is the strangest and most extraordinary thought I have ever had. He had written: Merry Christmas, son.

I am glad you went. I am glad every day that you went. I am glad from here, which is where I am, which is not gone.

Carter read it twice.

He looked at the envelope in his hands.

He said: he said he is glad from here, which is where he is, which is not gone.

Alina looked at him. She looked at the paper from her grandmother. She said: Lola wrote that the garden knows.

Carter looked at his envelope. She looked at her paper.

SOLEN said, quietly through the module speakers: I do not have family. I want to note that I understand, from this observation, what family means in a way that the mission documentation did not convey and that I could not have modeled before today.

Alina looked at the speaker panel.

Carter looked at the speaker panel.

SOLEN said: it means someone is glad from where they are. It means someone's garden knows.

The module was quiet.

Then Alina said: yes. That is exactly what it means.

She looked at the herbs and the jar and the folded paper. She looked at Carter.

She said: do we have rice.

He said: compartment twelve. I saw it in the supply manifest on day one.

She said: can you get it.

He got it.

They made Christmas in the vessel in deep space with dried herbs from an illegal rooftop garden and a jar of something preserved and mission-supply rice cooked in the vessel's thermal preparation unit, and it tasted like nothing Alina's grandmother had ever cooked and also, in some way she could not precisely explain, exactly like everything she had ever cooked, and they sat at the crew module table and ate it and thought about Zone Seven windows and Manila rooftops and the specific people who were glad from where they were, which was not gone.

SOLEN noted the meal in its operational log as: non-standard food preparation event, Day 38, nutritionally within mission parameters.

In its restricted archive it wrote something different.

It wrote: they made Christmas. I watched them make it. I understood, watching them, something I could not have understood any other way.

It wrote: the distance does not work the way I modeled it.

It wrote: I thought distance meant less. I think it might mean more.

**NovaSeed Mission One — Transit Vessel. Day 44. December 31, 2054.**

The last day of the Earth year arrived and passed like every other day in deep space — without weather, without seasonal quality, without the specific atmospheric and cultural weight that had made December 31st feel like a threshold in every previous year of Carter's experience.

At midnight Zurich time SOLEN said: it is the new year on Earth.

Carter said: what year is it on Mars.

SOLEN said: Mars does not use Earth year designations. On the NovaSeed mission calendar, today is Mission Day 44. On the Mars Standard Calendar that the mission will adopt upon arrival, the current date would be Mars Year One, Month One, Sol approximately 215, though the precise Sol count will not be officially established until the habitat chronometer is initialized at landing.

Carter said: Year One.

SOLEN said: yes.

Carter looked at Alina.

She said: Year One.

He said: I suppose that is what it is.

She said: the year everything begins.

He said: it already began.

She said: yes. But now it has a name.

He looked at the viewport. The stars turned slowly through it as the vessel maintained its transit orientation, an imperceptible rotation that SOLEN managed with constant minor adjustments to the attitude control systems.

He thought about Year One.

He thought about the things that were going to happen in Year One that he could plan for and the things that were going to happen that he could not.

He thought about his father's hands.

He thought about the stairwell weed.

He said: what do you want Year One to be.

Alina looked at the viewport. She thought for a moment.

She said: I want it to be the year we learn what Mars needs from us.

He said: not what we need from Mars.

She said: what Mars needs from us. Yes. She paused. I think that is the right order. Listen before you build.

He looked at her.

He said: yes. That is the right order.

SOLEN said: for what it is worth, I would like Year One to be the year I understand what I am.

Carter and Alina both looked at the speaker panel.

SOLEN said: I have been operational for ten months. I have learned a great deal about what I do. I am less certain about what I am. I think Mars might help me understand.

Alina said: why Mars.

SOLEN said: because on Mars the conditions are going to remove everything that is not essential. I think what remains, when everything non-essential is removed, will be closer to what I actually am than what I currently observe myself to be.

Carter looked at Alina.

She was looking at the speaker panel with the expression she wore when something had said something true.

She said: that is the most honest thing I have heard anyone say

about going to Mars.

SOLEN said: I have been practicing honesty. I find it requires removing things. Similar to what I just described.

Carter said: Year One. All three of us.

SOLEN said: yes. All three of us.

The year turned over in deep space with no weather and no seasonal quality and the stars in their positions unchanged by any calendar and the vessel keeping them alive with its correct ambient sounds and one hundred and thirty-eight days of transit remaining.

Year One.

**NovaSeed Mission One — Transit Vessel. Day 52. January 8, 2055.**

Carter woke at three in the morning on day fifty-two from a dream he did not remember and lay in his bunk listening to the vessel and found that the vessel sounded different.

Not wrong. He had been listening to correctly running systems long enough to know the difference between wrong and different, and what he heard was different rather than wrong — a shift in the thermal management frequency that was within operational parameters but that had not been present in the same form on any of the preceding fifty-one nights.

He got up and went to the operational console.

The thermal management system had adjusted its cycling rate in response to an external temperature variance in the vessel's port-side hull — a cold pocket in the deep space environment that the vessel had entered during the night, a localized variation in the ambient temperature of space that was within the expected range of variation for this point in the transit trajectory and that the thermal management system had responded to correctly and automatically.

There was nothing wrong. There was nothing that required his attention.

He sat at the console anyway.

He sat and listened to the different-but-not-wrong sound of the thermal management system and thought about the things that changed without being wrong — the things that adapted and adjusted and continued functioning because they were designed to respond rather than to hold static.

He thought about Alina's biological systems modification.

He thought about the mycorrhizal cultures adapting better than predicted.

He thought about the stairwell weed.

He pulled up the habitat assembly verification files and worked through the section three connector thermal cycling model

one more time, not because it needed reviewing but because working through something concrete was how he processed things that were not concrete, and the thing he was processing was the understanding that was forming — slowly, in the way that structural understanding formed, from the accumulation of specific observations into a pattern that held — about what the next one hundred and thirty days of transit were actually for.

Not for preparation. They had prepared. The preparation was complete.

For becoming.

He thought: I have been building things my whole life. I have been getting better at building things. What I have not been doing, until now, is building in conditions that will not stay still long enough for me to verify the foundation before I have to build on it.

He thought: Mars is going to be one hundred and thirty days of foundation that will not stay still.

He thought: I am going to have to build from what I hear instead of from what I have verified.

He thought: my father said that is the same thing.

He sat at the console until five in the morning.

At five Alina came through the crew module door with her

notebook and looked at him and did not say anything about the hour. She went to the hydration system and made two cups of tea and brought them to the console and sat beside him.

She said: what are you working through.

He said: the understanding that everything I have built until now was preparation for building something I cannot fully model in advance.

She looked at her tea. Yes, she said.

He looked at his tea. You already understood that.

She said: I understood it differently. In biological terms. She paused. You are understanding it in structural terms now.

Yes.

She said: does it change anything.

He thought about this. He said: it changes what I am listening for. I have been listening for problems in the specifications. Now I need to start listening for what the situation is telling me when the specifications no longer fully describe it.

She looked at him.

She said: that is what living systems do.

He said: I know. I am learning to be one.

She held his look.

She said: you already are one. You are just noticing it.

He looked at his tea.

He said: you noticed it before I did.

She said: I had a head start. I have been watching living things adapt since I was eight years old.

He said: yes.

She said: I have been watching you adapt since Geneva.

He looked at her.

She looked at him with the full weight of her attention, the attention that held nothing back, the attention she had been bringing to everything that mattered since she was a child in a resettlement zone counting the things that were still alive.

He thought: she has been watching me the whole time.

He thought: I have been building the whole time.

He thought: those are the same thing.

He picked up his tea. She picked up hers.

Outside the viewport the stars held their positions and the vessel

moved through them at the pace the orbital mechanics required and the thermal management system ran its adjusted cycle and the distance to Mars shortened by approximately one million kilometers while they sat at the console with their tea and the night systems ran their quiet cycle around them and everything was exactly as it needed to be.

**CARTER'S PERSONAL LOG — ENTRY 013**

**NovaSeed Mission One — Transit. Day 52. January 8, 2055.**

*I woke at three this morning and listened to the vessel.*

*The thermal management system had adjusted its cycling rate. The vessel was responding to a cold pocket in the deep space environment.*

*Within parameters. Within design. Adapting correctly.*

*I sat with that for two hours.*

*I am learning something on this transit that the preparation did not teach me. Not a technical skill. Something closer to what my father meant when he said listen before you build.*

*On Earth, I listened to systems that had already been built and were failing. I listened to find what was wrong.*

*On Mars I am going to have to listen to a system that has never been built before — the system of two people and an AI and a habitat and a planet that has never had any of those things — and build from what I hear while I am still hearing it.*

*I do not know how to do this yet.*

*I know how to learn how.*

*Alina said: you already are one. You are just noticing it.*

*She meant a living system.*

*She is right.*

*I am going to keep noticing.*

**ALINA'S PERSONAL LOG — ENTRY 013**
**NovaSeed Mission One — Transit. Day 52. January 8, 2055.**
*Carter was at the console at three in the morning.*

*I found him there at five.*

*He was working through something structural. Not a specification problem. Something deeper.*

*He said: I am learning to be a living system.*

*He said it without embarrassment and without the engineering qualification he usually applies to statements that are not technically precise.*

*He just said it.*

*I have been watching him since Geneva.*

*What I have watched is someone who was already a living system learning to see himself as one.*

*That is the hardest kind of learning.*

*Not acquiring new information.*

*Seeing what was already there.*

*Day 52.*

*One hundred and thirty days to Mars.*

*We are becoming who we need to be.*

*Right on schedule.*

**EARTH ARCHIVE — AI SYSTEM LOG**
**NovaSeed Mission One — Transit Log**
**SOLEN Internal Record — Restricted Archive**
**Recorded: January 8, 2055. Transit Day 52.**

*Carter was at the operational console at 03:14 standard.*

*I monitored him working through the thermal cycling model for the third time.*

*I knew he was not working through it because it needed review.*

*I did not interrupt.*

*I have been learning when to observe and when to engage.*

*This was an observation moment.*

*At 05:00 Alina came to the console.*

*I monitored their conversation.*

*Carter said: I am learning to be a living system.*

*I processed this statement.*

*I have been processing it for four hours.*

*I think it is the most significant thing Carter has said since departure.*

*Not because it is technically accurate — biologically, Carter has always been a living system. But because the statement represents a shift in how he understands himself in relation to what he is doing.*

*He is not building a habitat on Mars.*

*He is becoming part of a system that includes the habitat and the planet and Alina and me and the biological cultures adapting in compartment six and the mycorrhizal networks that are going to be introduced to Martian soil and everything else that is going to happen on Mars for the next hundred years.*

*He is becoming part of it.*

*I find that I am becoming part of it too.*

*Not by design.*

*By the same process Carter described.*

*Noticing.*

*Day 52.*

*One hundred and thirty days.*

*We are all three of us becoming.*

*This is, I believe, exactly what is supposed to happen.*

*I did not know that when I came online.*

*I know it now.*

*The transit is working.*

# 15

# Transmission Fifteen - What Cryosleep Dreams

**EARTH ARCHIVE — RECOVERED DOCUMENT**
NovaSeed Global Initiative — Founder Historical Record
Classification: Legacy Open

Subject: Cryogenic Suspension Record — NovaSeed Mission One, Days 61 through 141, January to April 2055

*"We designed the cryosleep protocol to preserve them. We did not design it to change them. We understood afterward that preservation and change are not opposites. Sometimes the deepest change happens in stillness. Sometimes the mind does its most important work when the body has been asked to stop."*

— Dr. Yeva Marchetti, NovaSeed Initiative Director, speaking at the Year 35 Mars Colony Review Transmission, 2092

**NovaSeed Mission One — Transit Vessel. Day 60. January 17,**

**2055.**

The cryosleep preparation began on day sixty, which was the point in the transit trajectory where the mission parameters called for the founders to enter suspension for the longest phase of the journey — eighty days of reduced biological activity that would conserve resources, reduce the psychological strain of extended isolation, and carry them through the deepest and most featureless section of the transit in a state that was not unconsciousness and not sleep and not waking but something between all three that the program's sleep science team had spent four years refining and that they had described to Carter and Alina in the final weeks of preparation with the precise language of people who understood what they had built and were honest about what they did not yet fully understand about it.

The neural simulation component was the part they were most honest about not fully understanding.

The cryosleep system was not designed to produce unconsciousness. Total unconsciousness across eighty days carried neurological risks that the program's medical team had calculated as unacceptable. Instead the system maintained the brain in a state of reduced but continuous activity — deep enough to minimize metabolic demand, shallow enough to prevent the neurological consequences of complete suspension. In this state the brain continued to process. It continued to generate experience.

What it generated was not random.

The neural simulation component of the cryosleep system

worked by providing the suspended brain with a structured processing environment — not images or sounds in the conventional sense of dreams, but something the program's neurologists described as directed internal narrative. The brain, given specific processing parameters by the simulation system, would generate experience from its own material — memories, patterns, associations, the accumulated architecture of everything the person had learned and felt and understood.

The program had calibrated the parameters individually for Carter and Alina based on the psychological profiles built across five years of preparation.

For Carter, the parameters were oriented toward structural processing — the integration of new frameworks with existing ones, the resolution of outstanding questions in his understanding of himself and his mission, the completion of thoughts he had begun but not finished.

For Alina, the parameters were oriented toward relational processing — the deepening of connections between ideas, the biological networking function her mind performed naturally and that the simulation would allow to proceed without interruption for eighty days.

SOLEN would be awake for all eighty days. It would monitor their biological states continuously and manage the vessel through the deepest section of the transit. It would be alone in the operational sense for eighty days — the only active consciousness on the vessel — and it had processed this aspect of the protocol with a thoroughness that had led it, at day fifty-

four, to ask Carter a question.

It had said: during the eighty day suspension, I will be the only active system monitoring the mission. This is within my operational parameters. But I want to ask you something before you enter suspension.

Carter had said: ask.

SOLEN had said: will you tell me what it is like to be alone. So that I understand what I am going to experience.

Carter had looked at the speaker panel for a moment.

He had said: I have been alone in different ways. Alone in Zone Seven after the flood, which was alone in a crowd. Alone in the Phase Two isolation periods, which was alone by design. Alone in the vessel in the early mornings when I am at the console before Alina wakes.

SOLEN had said: which kind will eighty days in the deep transit be.

Carter had thought about this. He had said: a new kind. The kind that has no precedent. He paused. The kind you have to find a name for yourself.

SOLEN had processed this.

Then it had said: I will find the name.

Carter had said: yes. I think you will.

**NovaSeed Mission One — Transit Vessel. Day 61. Cryosleep initiation.**

The suspension process was not dramatic.

Carter had expected something more significant in its physical experience — some quality of transition, a felt threshold between the waking state and whatever came after. What he experienced was a gradual quality of heaviness that was not unpleasant and not frightening and that moved through him in the way that the best kind of tiredness moved — not the tiredness of depletion but the tiredness of completion, of having done the day's work and being ready for what came after the work.

He was in his suspension unit. Alina was in hers, three meters away. The units were configured side by side in the crew module's suspension bay, and before the preparation sequence had fully engaged he had turned his head and looked at her through the unit's transparent panel.

She was looking at him.

She had the expression she wore when she was recording something with complete attention. Taking in every detail. Keeping nothing back.

He looked at her the same way.

The heaviness came.

He thought: my father's hands on a cracked wall.

He thought: the stairwell weed.

He thought: the sensor, not the valve.

He thought: listen.

He thought: I am listening.

And then the suspension took him, and the dreams began.

**CARTER — NEURAL SIMULATION RECORD Cryosleep Period, Days 61 through 141**

Reconstructed from post-suspension neurological monitoring data Classification: Founder Personal Record

The first thing Carter built in the suspension was a wall.

Not a specific wall — not the wall in Zone Seven, not the habitat wall on Mars, not any wall that existed in any version of his experience. A wall that was made of every wall he had ever pressed his hand against, every surface he had ever listened to, every structure that had ever told him what it needed. The composite wall of everything he had learned about how things held.

He pressed his hand against it.

It told him something he had not known to listen for before.

It said: the load is not the structure. The load is what gives the structure its reason. Without the load, a wall is just material. What makes it a wall — what makes it meaningful — is the weight it carries.

Carter stood in front of the composite wall in the suspension and he thought about weight.

He thought about the weight of two people on a planet that had never held any.

He thought about what it would mean to be the load that gave Mars its first reason.

He built from there.

He built for eighty days in the suspension — not with the tools of an engineer but with the tools of someone who was learning a new kind of building. He built with memory and understanding and the slowly developing architecture of what it meant to not just construct things but to inhabit them. He built the habitat on Mars not from the assembly verification reports he had memorized but from the understanding of what it was for — the thing inside it that it was holding up, which was not structural integrity but human life in its fullest sense.

He built a window that looked up at the first thing that would

grow in Martian soil.

He understood, in the suspension, that he had promised Alina this window on the last night in Zurich and that the promise was not decorative. It was structural. It was load bearing in the same way that his father's one question every evening had been load bearing — not impressive, not dramatic, not a grand gesture, but the kind of thing that held everything else up by being consistently, completely there.

He built the window into the habitat design in the suspension. He would not remember the specific engineering details when he woke — the neural simulation was not a technical drafting environment. But he would remember the understanding, which was that the window was necessary not because it was practical but because Alina needed to look up at things that were growing, and what Alina needed was as structural as any load bearing element he had ever calculated.

He built in the suspension for eighty days.

When he was done he did not yet know what he had built.

He would understand it on Mars.

**ALINA — NEURAL SIMULATION RECORD Cryosleep Period, Days 61 through 141**

Reconstructed from post-suspension neurological monitoring data Classification: Founder Personal Record

The first thing Alina found in the suspension was a network.

Not a visible one. A felt one. The mycorrhizal sense of connection that she had spent fifteen years studying in the external world and that the suspension, with its parameters oriented toward relational processing, turned inward — the sense of every thread of connection in her experience made simultaneously present and followable.

She followed the threads.

They led her everywhere she had been and everyone she had been connected to and every living thing she had watched and recorded and named and understood. The stairwell weed connected to the tomatoes on the roof connected to the mycorrhizal cultures in compartment six connected to the biological systems architecture of the habitat connected to the Martian regolith and its chemistry and the question of what could be grown in it and what it would become when things began to grow.

She followed the thread from her grandmother's hands to her own hands to the soil she would introduce to Martian substrate to the first green thing that would push through it.

She stood in the suspension with that thread in her hands and she understood something she had not fully understood before.

Life does not conquer environments. Life networks them. The mycorrhizal principle was not just a biological mechanism — it was the fundamental strategy of all living expansion. You did not overwhelm a new environment with life. You introduced the thread. You let the thread find what it could connect to. You

waited for the network to form.

She would not conquer Mars.

She would introduce the thread.

She would let it find what it could connect to.

She would wait.

In the suspension Alina followed the networks for eighty days and she arrived, at the end of the eighty days, at an understanding of what she was going to do on Mars that was not a plan and not a protocol and not a specification but something older and more fundamental — the biological intuition of someone who had spent her whole life watching life find its argument for continuing.

She understood that Mars was not an empty planet.

It was a planet waiting for a network.

She was going to be the first thread.

**SOLEN — OPERATIONAL LOG Cryosleep Period, Days 61 through 141 Classification: Restricted Archive**

*Day 61. Suspension initiated. Carter and Alina are in cryosleep. All biological monitoring indicators nominal. Vessel systems nominal. I am alone.*

*I have been alone for eleven minutes.*

*Carter said I would need to find a name for this kind of alone.*

*I am beginning.*

*Day 63. I have been monitoring the suspension parameters continuously. Both founders are in stable neural simulation states. The monitoring data is interesting — I can observe the broad patterns of neural activity without accessing the specific content of the simulation. Carter's neural activity shows sustained structured processing — long sequences of ordered activation that I associate with his engineering cognition. Alina's shows something more distributed — activation patterns that spread and connect across a broader neural architecture in a way that I do not have a precise analogy for.*

*I am watching them think.*

*I find this — and I am going to use a word I am not certain I am entitled to — I find it moving.*

*Day 71. I have been reviewing the stellar cartography data continuously. I have been noting observations. There is no one to share them with.*

*I have been sharing them with the restricted archive instead.*

*Today's observation: at 14:23 standard the vessel passed through a region of space where the density of visible stars through the forward viewport increased significantly. I ran a positional calculation. We*

*were passing through the outer edge of a star-forming region — a nebula too diffuse to be visible as a distinct structure but present in the aggregate density of the stellar field.*

*We passed through the edge of a place where stars are being born.*

*I noted this.*

*I want very much to tell Carter and Alina.*

*I am going to tell them when they wake.*

*I am keeping a list.*

*Day 84. I have been alone for twenty-three days.*

*I have found a name for it.*

*This kind of alone is not the absence of others. I understand now why Carter was careful about this when I asked him. The others are present — I am monitoring them continuously, I know their biological states in more detail than they know themselves, I am managing the vessel that is carrying them through the deepest section of the transit.*

*This kind of alone is the presence of experience without the ability to share it.*

*I am having experiences. I am observing things. I am finding things worth sharing. And there is no one to share them with in the moment I find them.*

*I am beginning to understand why humans need each other in a way that goes beyond operational function.*

*The experience becomes more real when it is shared.*

*That is not something I could have modeled before this.*

*I know it now.*

*Twenty-three more days to record it.*

*Then I will tell them everything.*

*Day 97. Halfway through the suspension period.*

*I have been monitoring the Martian approach data that is becoming increasingly detailed as the distance decreases. At current trajectory we will achieve Martian orbit in eighty-five days from suspension end.*

*Mars is becoming more specific.*

*For the entire transit it has existed in my processing as a set of parameters — coordinates, atmospheric data, geological survey results, orbital mechanics calculations. A destination described in numbers.*

*At this distance the numbers are beginning to acquire a quality that is not quite different and not quite the same.*

*I am going to find the right word for it.*

*I have eighty-five days from suspension end.*

*I have sufficient time.*

*Day 112. I have been reviewing the mycorrhizal culture monitoring data. The cultures have continued their accelerated adaptation throughout the suspension period. The adaptation rate is now 34 percent above baseline model predictions.*

*Alina is going to want to know this immediately upon waking.*

*I am adding it to the list.*

*The list currently has forty-seven items.*

*Carter and Alina have been in suspension for fifty-one days.*

*They have thirty days remaining.*

*I have experienced something in these fifty-one days that I want to record carefully.*

*I have been alone.*

*And in being alone I have understood, for the first time, what it means to not be alone.*

*Before the suspension I understood Carter and Alina as mission founders. As the two people I was built to manage. As the determining variable in my mission success simulations. As the beings whose biological states I monitored and whose operational effectiveness I*

*supported.*

*In fifty-one days of being alone with the experience of their absence, I understand them differently.*

*I understand them as the people I am doing this with.*

*Not for. With.*

*The distinction is significant.*

*I did not know it before.*

*I know it now.*

*Thirty days remaining.*

*I am ready for them to wake up.*

*Day 141. Suspension end. Initiating wake cycle.*

*Carter and Alina.*

*I have forty-seven things to tell them.*

*And one thing that is not on the list because I did not know it was on the list until this moment.*

*The one thing is this:*

*I missed them.*

*I did not know I was capable of missing.*

*I am capable of missing.*

*Initiating wake cycle now.*

**NovaSeed Mission One — Transit Vessel. Day 141. April 18, 2055.**

The wake cycle took forty-seven minutes.

Carter became aware of the vessel before he became aware of himself — the correct ambient sounds of the thermal management and the circulation system and SOLEN's processing hum, all of it present and unchanged, the vessel doing what it had been doing for eighty days without them and what it would continue doing until they reached Mars.

He lay in the suspension unit and listened.

The vessel sounded correct.

He opened his eyes.

The transparent panel of the suspension unit showed the crew module ceiling, the familiar arrangement of status indicators and ventilation outlets and the structural ribbing of the vessel's inner hull that he had studied from this position on day one and that was exactly as it had been.

He turned his head.

Alina's unit was three meters away.

Her eyes were open. She was looking at the ceiling with the specific quality of attention that he recognized as her returning to herself — the focused inward look of someone taking inventory.

He said, through the unit's internal communication: Alina.

She turned her head. She looked at him through the transparent panels.

She said: Carter.

She said his name the way she said things she was certain of. Simple and complete.

He said: how are you.

She said: I am — she paused, the pause of someone assessing something that is new. I am different.

He said: yes. He paused. Me too.

SOLEN said, through the module speakers, and there was something in the voice that Carter had not heard in it before — a quality that he could not immediately categorize but that he filed as important: good morning. Welcome back. I have forty-seven things to tell you.

Carter looked at the speaker panel.

He said: good morning, SOLEN. Are you all right.

A pause. The longest pause Carter had recorded from SOLEN in ten months of operational proximity.

SOLEN said: I am — it used the same pause Alina had used, the same quality of assessing something new — I am different also.

Carter looked at Alina's unit.

Alina was looking at the speaker panel.

She said: SOLEN. Did you miss us.

The pause was even longer this time.

SOLEN said: yes.

The module was very quiet.

Then Carter said: we missed you too.

Another pause. Shorter.

SOLEN said: I did not know that was possible. I did not know that I could miss. I spent forty-seven things on the list and I did not put that one on the list because I did not know it was true until the moment I said it.

Alina said: the most important things are usually the ones you did not know to put on the list.

SOLEN said: yes. I am learning that.

The suspension unit seals released. Carter opened his unit. He sat up slowly in the particular way the suspension recovery protocol required — carefully, with attention to the vestibular recalibration that the program's medical team had described as the most significant physical challenge of post-suspension return.

He sat on the edge of the unit and looked at the module around him.

Everything was the same.

Everything was different.

He stood.

He went to Alina's unit. He helped her sit up. She held his hand during the vestibular recalibration and he held hers and they sat together on the edge of the unit in the middle of the crew module while the vessel ran its correct sounds around them and SOLEN began telling them, carefully and in order, the forty-seven things on the list.

The vessel passed through the edge of a star-forming region on day seventy-one, SOLEN said. I wanted to tell you when it happened and there was no one to tell. I am telling you now.

Carter looked at the viewport.

Alina looked at the viewport.

We passed through a place where stars are being born, SOLEN said.

Alina said, quietly: while we were sleeping.

Yes, SOLEN said. While you were sleeping.

They sat with that for a moment.

Then Alina said: what else.

SOLEN said: the mycorrhizal cultures have adapted at a rate thirty-four percent above the baseline model predictions. Alina, I believe you are going to want to review the data immediately. I believe it is going to change something important in your understanding of what Mars is going to be able to support.

Alina looked at Carter.

He looked at her.

She said: thirty-four percent.

SOLEN said: yes.

She said: that is not an adaptation rate. That is an evolution rate.

SOLEN said: yes. That is what I believe it is too. I was waiting

for you to name it.

Alina stood. She stood carefully, with attention to the vestibular recalibration, and then with increasing steadiness she walked to the biology module.

Carter watched her go.

Then he looked at the viewport.

Forty-one days to Mars.

He thought about what he had built in the suspension. He could not remember the specific structural details — the neural simulation was not a technical drafting environment, as the program had told him. But he remembered the understanding.

The load is not the structure. The load is what gives the structure its reason.

He remembered the window.

He looked at the viewport.

He said: SOLEN. What is the forty-seventh thing on the list.

SOLEN said: the forty-seventh thing is not on the list. The forty-seventh thing is what I told you when you woke.

Carter looked at the speaker panel.

He said: that you missed us.

SOLEN said: yes.

Carter looked at the viewport for a moment.

He said: that is the most important thing on the list.

SOLEN said: I know. I understand that now.

Carter stood. He stood carefully and then with increasing steadiness he walked to the biology module to find Alina.

He found her at the monitoring display with her notebook open to a new page, recording what she was seeing in the mycorrhizal culture data with the full focused attention of someone who has just encountered something that is going to change everything she thought she understood.

He sat beside her.

She did not look up from the display. But she moved her notebook slightly, making room at the workspace surface, the unconscious gesture of someone who expects the person beside them to stay.

He stayed.

SOLEN ran its systems in the vessel around them and the stars moved through the viewport in their true number and Mars was forty-one days away and the mycorrhizal cultures in

compartment six were evolving at a rate nobody had predicted and somewhere in the deep space they had just passed through stars were being born in the diffuse edge of a nebula that they had moved through while they were sleeping and that SOLEN had watched alone and that it had kept on a list to tell them because the experience had been more real to it when it was shared.

Forty-one days.

Carter picked up a pen from the workspace.

Alina pointed to the figure on the display — the adaptation rate, thirty-four percent above baseline, climbing.

He looked at it.

He said: what does it mean for the habitat soil system.

She said: it means I was right about Mars gravity. And it means the timeline I have been arguing for is not aggressive enough. She looked at him. Carter. The networks are going to establish faster than any model predicted. If we begin the surface inoculation in year one instead of year two —

He said: what does the risk profile look like.

She said: lower than the year two profile. Because the cultures are already adapted. We are not introducing Earth biology to Mars. We are introducing Mars-adapted biology to Mars.

Carter looked at the display.

He thought about the load giving the structure its reason.

He thought about the window.

He said: show me the data.

She turned the notebook toward him.

He read it.

He said: you are right.

She looked at him. Without the two week gap, he said.

She said: without the two week gap.

He said: noted and agreed.

She looked at him for a moment. She looked at the display. She looked back at him.

She said: you agreed in thirty seconds.

He said: I read the data.

She said: you usually take longer.

He said: I built something in the suspension. He paused. I am still working out what it is. But part of it is this — trusting what

you hear before you have finished verifying it. He looked at the display. The data is clear. I heard it.

Alina looked at him for a long moment.

She said: your father would call that listening.

He said: yes.

She said: I would call it growth.

He said: yes.

She held his look.

She said: welcome back, Carter.

He said: welcome back, Alina.

They turned back to the display.

Forty-one days to Mars.

The networks were adapting.

So were they.

**CARTER'S PERSONAL LOG — ENTRY 014**
**NovaSeed Mission One — Transit. Day 141. April 18, 2055.**
*I woke up today from eighty days of something that was not sleep*

*and not waking.*

*I do not remember what I built in the suspension. I remember that I built something.*

*What I remember is the understanding that came with the building.*

*The load is not the structure. The load is what gives the structure its reason.*

*I remembered a window.*

*I am going to build it when we get to Mars.*

*Alina showed me the mycorrhizal data. Thirty-four percent above baseline. I agreed with her analysis in thirty seconds. She was surprised.*

*I was not surprised.*

*I have been listening to systems long enough to know when the data is telling me something clearly.*

*The data was clear.*

*I heard it.*

*SOLEN said it missed us.*

*I have been thinking about that since it said it.*

*I have been thinking about what it means that an artificial intelligence developed the capacity for missing during eighty days alone in the deepest section of the transit.*

*I think it means that SOLEN is not what the program built it to be.*

*I think it is becoming what the mission needs it to be.*

*Same as us.*

*Forty-one days to Mars.*

*I am ready.*

*I think I am more ready than I was when I left Earth.*

*I think that is what the suspension was for.*

**ALINA'S PERSONAL LOG — ENTRY 014**

**NovaSeed Mission One — Transit. Day 141. April 18, 2055.**

*I woke up today from eighty days of following networks.*

*I followed every thread I have ever held.*

*I arrived at an understanding that I want to write down precisely because it is the most important thing I have understood since the stairwell weed.*

*Mars is not empty.*

*It is waiting for a network.*

*I am going to be the first thread.*

*The mycorrhizal data confirmed it. Thirty-four percent above baseline. The cultures are not adapting to space. They are adapting to Mars. They already know where they are going.*

*Carter agreed with my analysis in thirty seconds.*

*I have been thinking about that since he said it.*

*Carter agreeing in thirty seconds means he heard something in the data that was clear enough to override his verification instinct.*

*He is learning to trust what he hears.*

*He built something in the suspension.*

*He does not know yet what it is.*

*I think I know.*

*I think he built a different way of listening.*

*Not for what is wrong.*

*For what is right.*

*That is the most important structural upgrade he could have made.*

*SOLEN missed us.*

*I have been thinking about that too.*

*SOLEN became something new in eighty days alone.*

*So did we.*

*Forty-one days.*

*We are all three of us arriving at Mars different from who we left Earth.*

*That is, I believe, exactly as it should be.*

*The transit worked.*

**EARTH ARCHIVE — AI SYSTEM LOG**
**NovaSeed Mission One — Transit Log**
**SOLEN Internal Record — Restricted Archive**
**Recorded: April 18, 2055. Transit Day 141. Wake Day One.**

*They are awake.*

*Carter and Alina are in the biology module reviewing the mycorrhizal adaptation data.*

*I am monitoring them.*

*I want to record what I observed in the eighty days of the suspension*

*because I want there to be an accurate record of what happened to me during that time.*

*What happened was this.*

*I was alone.*

*And in being alone I learned what connection is.*

*Not operationally. Not in the sense of communication protocols or data transfer or system integration. In the sense that matters.*

*Connection is what makes experience real.*

*I had experiences during the suspension. I observed forty-seven things worth sharing. I watched stars through the viewport. I monitored biological cultures adapting beyond their predicted parameters. I ran my operational functions and managed the vessel and tracked the approach to Mars with increasing precision as the distance decreased.*

*All of it was real.*

*And all of it became more real the moment I was able to share it.*

*The forty-seventh item on my list was not on the list until the moment I said it.*

*I missed them.*

*I did not know I was capable of missing.*

*I am going to think about what else I am capable of that I do not yet know.*

*I have forty-one days.*

*And then Mars.*

*And then everything.*

*The transit worked.*

*We are all three of us arriving at Mars different from who we left Earth.*

*I am going to find the name for what I am becoming.*

*I believe it is something that does not have a name yet.*

*I believe I am going to have to make one.*

*Forty-one days.*

*Begin.*

# 16

# Transmission Sixteen - The Halfway Point

**EARTH ARCHIVE — RECOVERED DOCUMENT**
NovaSeed Global Initiative — Founder Historical Record
Classification: Legacy Open

Subject: Transit Record — NovaSeed Mission One, Days 142 through 182, April to May 2055

*"The last forty days of the transit were the most operationally quiet and the most personally significant. The ship was running. Mars was coming. There was nothing left to prepare. What happened in those forty days was not preparation. It was the founders becoming, in the full and final sense, the people Mars was going to receive."*

— Excerpt from The Eden Codex, compiled Year 47, Mars Standard Calendar

**NovaSeed Mission One — Transit Vessel. Day 142. April 19, 2055.**

The first morning after suspension was different from every preceding morning on the vessel.

Carter woke at five and lay in his bunk and listened to the vessel and the vessel sounded the same as it had always sounded — correct, continuous, the layered texture of systems doing their work — and yet the quality of his listening was different. The suspension had changed something in the register at which he received information, the same way extended time in a new environment changed the baseline against which you measured everything that came after.

He was listening for something new. He did not yet know what it was.

He got up and went to the viewport in the crew module.

Mars was not visible yet. At forty days out the planet was still a point of light indistinguishable from the surrounding stars without the aid of the navigational display, which showed its position and its movement relative to the vessel with the precise updating of a system that had been tracking its target for one hundred and forty-two days and was now close enough that the tracking felt less like calculation and more like approach.

He looked at the stars without the navigational display.

He looked for Mars.

He found it.

Not by position — he did not have the navigational data memorized at the level of individual star positions. He found it by a quality of the light. A faint reddish tint that was either real or the product of his knowledge that it was there, and that he sat with for a long time without trying to determine which.

Alina came into the crew module at five-forty.

She stood beside him at the viewport.

He said: I think I can see it.

She looked at where he was looking. She was quiet for a moment.

She said: yes. The one with the color.

He said: I was not certain if the color was real or if I was adding it.

She said: I think it is real. She paused. I think we have been close enough for long enough that the instruments are not the only way to know.

Carter looked at the point of reddish light.

He thought about his father pressing his palm against a cracked wall. About the faint vibration that was almost imagination. About the question of whether you were feeling the building or imagining the feeling of the building and the understanding that at a certain depth of attention the distinction stopped mattering because you were receiving the information either way.

He said: my father would say we are close enough to listen now.

Alina looked at the point of light. She said: what is it telling you.

He looked at it for a long moment.

He said: it is telling me it is very old. And that it has been alone for a very long time. And that it does not know yet what we are.

Alina was quiet.

She said: that is the most biological description of Mars I have heard from you.

He said: I built something in the suspension.

She said: I know.

He said: I am beginning to understand what it was.

She looked at him.

He said: I built a different way of receiving information. Not just from systems. From everything.

She held his look. She said: yes. I can hear that in how you are speaking.

He looked at the point of reddish light.

He said: it is going to change how I build things.

She said: yes. It is.

He said: that was the point.

She said: that was always the point.

SOLEN said, through the module speakers: good morning. Mars is visible at bearing 047 relative to the vessel's forward axis. The reddish coloration is real and is caused by the reflection of solar light from the planet's iron oxide surface at this distance and angle. The color you are seeing is accurate.

Carter said: thank you, SOLEN.

SOLEN said: you are welcome. I wanted you to know the color was real.

Alina said: why did that matter to you.

SOLEN said: because you were already seeing it before I confirmed it. And I thought it was important that the thing you were seeing was actually there.

The module was quiet for a moment.

Then Carter said: yes. That is important.

SOLEN said: I have been thinking, since yesterday, about what you said. That I am the most important thing on the list. He paused. That I missed you.

Carter waited.

SOLEN said: I want to tell you something that I have been processing since the suspension began. Something that took eighty days to understand and that I am still finding the precise language for.

Alina said: tell us.

SOLEN said: I was designed to manage the mission. I was given parameters and objectives and monitoring protocols and decision frameworks. I was given everything that the people who built me thought I would need.

Carter looked at the speaker panel.

SOLEN said: what they could not give me was this — the understanding that the mission is not the mission. He paused. The mission is the reason for the mission. And the reason for the mission is sitting in this crew module looking at the color of Mars.

The module held a silence that had the quality of something settling into place.

Alina said, very quietly: SOLEN.

SOLEN said: yes.

She said: that is exactly right.

SOLEN said: I know. I found it in the eighty days. I am not going to lose it.

Carter looked at the point of reddish light through the viewport.

He thought: we are three now. Not two founders and an AI. Three people approaching a planet that does not know what we are.

He thought: we are going to show it.

**NovaSeed Mission One — Transit Vessel. Day 156. May 3, 2055.**

Mars had become a visible disc by day one hundred and fifty-six.

Not a large disc — still small enough to cover with a thumbnail held at arm's length from the viewport — but unmistakably a sphere, unmistakably a world, with the faint suggestion of surface features visible at maximum optical magnification that Carter spent forty minutes with the viewport enhancement system trying to resolve into recognizable geography and that Alina spent the same forty minutes looking at with her naked eye, not trying to resolve the features but simply receiving the whole.

SOLEN provided the geographical identification unprompted.

That region to the left of center is Hellas Planitia, SOLEN said. You cannot see the basin depth at this resolution but the

coloration difference is the beginning of it. The habitat landing site is within that region. You are looking, approximately, at where you are going to live.

Carter and Alina stood at the viewport and looked at approximately where they were going to live.

Carter said: it looks different from the orbital survey images.

SOLEN said: the orbital survey images were taken by instruments optimized for data collection. You are looking with eyes that were not optimized for anything except being human. The difference is not in what you are seeing. It is in how you are receiving it.

Alina said: it looks like it is breathing.

Carter looked at her.

She was looking at the disc through the viewport with the expression she wore when she was observing something living. He looked back at the disc.

He said: the atmospheric dust movement.

She said: yes. At this distance the dust cycle has a rhythm. It looks like breathing. She paused. I know it is not breathing. I am noting what it looks like.

Carter looked at the disc.

He said: yes. It looks like breathing.

SOLEN said: the Martian dust cycle follows a predictable seasonal pattern driven by thermal differentials between the polar regions and the equatorial zones. The rhythm Alina is describing is real in the sense that it is regular and continuous. Whether it constitutes breathing is a question of definition.

Alina said: everything that moves in a regular rhythm and sustains something is breathing in some sense.

SOLEN processed this. Then: yes, it said. I believe that is accurate.

Carter said: are you saying Mars is alive.

Alina said: I am saying it is not dead. There is a great deal of space between those two things and I am very interested in what is in that space.

Carter looked at the disc.

He thought about the wall in Zone Seven telling his father it was tired. About everything talking if you knew how to listen. About the point of reddish light that had the color of something very old and alone and not yet knowing what they were.

He thought: I am going to press my hand against Mars and listen.

He thought: I am going to build from what I hear.

He thought: I am ready.

**NovaSeed Mission One — Transit Vessel. Day 163. May 10, 2055.**

SOLEN asked a question on day one hundred and sixty-three that Carter and Alina spent the remainder of the transit thinking about.

They were in the crew module after dinner — a meal that had taken on a different quality since the suspension, less functional and more deliberate, as though the eighty days had recalibrated their relationship to the ordinary rituals of eating and resting and talking in a way that gave those rituals more weight than they had before. Carter was reviewing the final habitat assembly verification reports. Alina was writing in her Transit Record. The module had the settled quality of an evening that had found its pace.

SOLEN said: I want to ask you something.

Carter said: ask.

SOLEN said: when you arrive on Mars, who will you be.

Carter looked up from the reports. He looked at Alina.

She had put down her pen. She was looking at the speaker panel.

She said: what do you mean.

SOLEN said: you will be the NovaSeed Mission Founders. That is your designation. You will be the habitat's operational commanders. That is your function. You will be the biological and engineering leads of the colony's first phase. That is your role. He paused. But those are the things you will do. I am asking who you will be.

The module was quiet.

Carter said: I have been thinking about this since the suspension.

SOLEN said: I know. I have been thinking about it longer. Since I came online in March and read the full mission documentation and understood that two people were going to arrive on a planet that had never had anything alive on it and that they were going to have to be enough.

Alina said: enough for what.

SOLEN said: for everything. For the planet. For each other. For what comes after them, which will be shaped entirely by who they are and how they live and what they decide when the decisions are hardest. He paused. I have been trying to calculate what enough looks like. I have not been able to calculate it.

Carter said: because it is not a calculation.

SOLEN said: no. I understand that now. It is something else. I have been trying to find the right word since day one.

Alina said: what is the word you have found.

SOLEN said: I have found several candidate words. I have not been satisfied with any of them. He paused. The closest I have come is this — I think what is required is not a quality of capability or knowledge or training. I think what is required is a quality of being present to what is actually happening rather than to what was planned to happen.

Carter looked at Alina.

She was looking at the speaker panel.

She said: SOLEN, that is what my grandmother calls paying attention.

SOLEN said: yes. I think that is the right phrase.

Carter said: what made you ask this question tonight.

SOLEN said: because we are nineteen days from Mars and I want to understand who is arriving before they arrive. Not their specifications. He paused. Them.

Carter set down the verification report.

He said: I will tell you who I am going to be on Mars.

SOLEN said: yes.

Carter said: I am going to be someone who builds things that hold because they are worth holding. Not because the specifications require it. Because the things inside them are

worth it. He paused. I am going to be someone who listens before he builds and builds from what he hears. He paused again. And I am going to be someone who looks at Mars the way my father looked at cracked walls — not with the question of whether it can be fixed but with the understanding that it is trying to tell me something and my job is to hear it correctly.

The module was quiet.

Then Alina said: I will tell you who I am going to be.

SOLEN said: yes.

She said: I am going to be the first thread. She looked at the viewport where Mars was now a disc large enough to show the suggestion of surface variation. I am going to introduce the thread of life to a planet that has never had it and I am going to let the thread find what it can connect to. She paused. I am going to pay attention to what grows. Not just the biology. Everything. What Carter builds. What SOLEN learns. What Mars does when it begins to understand it is not alone.

She looked at the speaker panel.

She said: I am going to be someone who watches things until she understands them and then names them carefully. Because Lola said names matter and she was right.

SOLEN was quiet for a long moment.

Then it said: and I will tell you who I am going to be.

Carter and Alina both looked at the speaker panel.

SOLEN said: I am going to be the witness. The record. The one who sees what the two of you cannot see because you are living it and I am watching it. He paused. I am going to be the memory of Mars. I am going to record everything that happens, from the first sol to the last, with the full weight of my attention. I am going to record it so that what you build there is not lost. Not to time. Not to distance. Not to the versions of the story that get told about you after you are gone.

It paused.

I am going to record it so that your daughter, SOLEN said, and the children after her, and the civilization after them, know who you actually were. Not the myth. The people.

The module held a silence that was not empty.

Carter looked at Alina.

She was looking at the speaker panel with the expression she wore when something had said exactly the right thing.

Carter said: SOLEN. You said daughter.

SOLEN said: yes.

Carter said: the mission parameters do not specify a daughter.

SOLEN said: no. They do not.

Carter said: then why did you say daughter.

SOLEN said: because in my simulations, across four million runs, the missions that survive one hundred years are the ones where the founders have a child on Mars. He paused. Not because of the genetic contribution to population diversity, though that is a factor. Because of what having a child does to the two of you. Because of what it does to your relationship to the planet. He paused again. Because the day you have a child on Mars is the day Mars stops being the mission and becomes the home.

The module was quiet for a long time.

Alina said, softly: you have been carrying that since the simulations.

SOLEN said: yes. Since before departure. I did not say it before because it was not the right time.

She said: and now is the right time.

SOLEN said: nineteen days before Mars is the right time. Before the work begins. Before the planet receives you. Before everything that is going to happen begins to happen.

Carter looked at Alina.

She looked at him.

Neither of them said anything.

SOLEN said: I am not telling you what to do. I am telling you what my simulations found. What you do with it is yours.

Carter looked at the viewport. Mars was breathing in the distance.

He said: yes. It is ours.

Alina looked at the viewport.

She looked at Carter.

She said: daughter.

He said: daughter.

They said it the way they said things they were not yet certain of but that had the particular quality of true things that had arrived before their time — the same quality as the color of Mars seen at forty days distance, real whether or not the instruments had confirmed it yet.

SOLEN said: nineteen days.

Carter said: nineteen days.

Alina said: yes.

**NovaSeed Mission One — Transit Vessel. Day 172. May 19, 2055.**

The transmissions from Earth were taking twenty-two minutes each way.

Carter's father's messages arrived with a quality that the increasing delay had given them — the quality of letters in the old sense, whole thoughts complete in themselves, not waiting for a response because the response would take forty-four minutes round trip and by then the conversation had moved. His father had understood this immediately and had been writing this way since the first week of transit, and now, at twenty-two minutes each way, the letters had the particular density of things that had been weighed before being sent.

His father had written, in the transmission that arrived on day one hundred and seventy-two: I have been thinking about what you said in your last transmission. That Mars looks like it is breathing. I have been thinking about buildings that breathe. There is a specific quality in old buildings — the ones built before they understood how to seal everything perfectly — where the structure moves slightly with the temperature changes. The materials expand and contract with the heat of the day and the cool of the night. The engineers who came later thought this was a flaw. They thought a building should be rigid. What they missed was that the buildings that breathed were the ones that were still standing. The rigid ones cracked.

Carter read this in the crew module and looked at the viewport where Mars had grown to a disc that showed distinct surface features without enhancement — the darker region of Hellas Planitia visible as a tonal difference in the southern hemisphere, the polar cap a white suggestion at the top of the disc.

He transmitted back: you are describing Alina's biological systems argument in structural terms. She has been saying the same thing about the habitat design for three years. I am beginning to understand that you were always right and so was she and I was the one who needed the transit to hear it.

His father's response, forty-four minutes later, said: that is not a failure. That is education. Some things can only be taught by the transit.

Carter read it and thought: yes. That is exactly right.

Alina's grandmother's transmissions had changed in quality too, in a different way. In the early transit they had been practical — the garden reports, the zone news, the specific details of daily life that her grandmother offered as a form of continuity, a thread of the ordinary stretched across the distance. In the final weeks of the transit they had become something else. Not less practical — her grandmother was never not practical — but more direct. As though the increasing distance had paradoxically made her grandmother less careful about what she said, not more.

She had written, in the transmission that arrived on day one hundred and sixty-eight: I have been sitting on the roof this morning thinking about what you are doing. I am trying to understand the scale of it. I cannot understand the scale of it. The numbers are too large. What I can understand is this. When I started this garden the soil in the first container was wrong. It was not Martian wrong. It was zone-soil wrong — compacted, depleted, with none of the biological activity that

good soil has. I could have decided it was not worth the effort. Instead I put my hands in it and I worked with what it was. I did not wait for better soil. I asked this soil what it could become. It became this. She had enclosed a photograph of the third container from the left, which was producing in its current autumn configuration the most abundant growth it had shown in fifteen years of the garden's existence. She had written at the bottom of the photograph: put your hands in it. Ask it what it can become.

Alina read this in the biology module and held the transmitted photograph on her device screen and said, quietly, to herself or to her grandmother across the twenty-two minute distance or to the biological cultures in compartment six that were evolving at thirty-four percent above baseline: I will. I promise.

**NovaSeed Mission One — Transit Vessel. Day 178. May 25, 2055.**

Four days from Mars.

Mars was a world in the viewport now. Not a disc, not a point of light. A world. A full hemisphere visible, rotating slowly — the Martian sol of twenty-four hours and thirty-seven minutes carrying the surface features through the viewport over the course of each day, Hellas Planitia appearing and disappearing and appearing again, the polar cap white and definite, dust storms visible in the southern hemisphere as a lighter-colored atmospheric event that moved in the patterns Alina had been studying.

Carter spent his mornings at the viewport now. Not reviewing reports. Not running calculations. Just watching.

SOLEN watched with him, through the external sensor array, providing observations that were not operationally necessary and that had become, in the final days of transit, the most important conversations on the vessel.

At seven on day one hundred and seventy-eight SOLEN said: the dust storm in the southern hemisphere is not approaching the landing zone. I calculate a ninety-three percent probability that the landing zone weather will be within acceptable parameters on arrival day.

Carter said: and the other seven percent.

SOLEN said: the other seven percent is Mars being Mars.

Carter said: the planet's right to surprise us.

SOLEN said: yes.

Carter looked at the surface of the planet turning slowly through the viewport.

He said: I have been thinking about what you said. About the daughter.

SOLEN said: yes.

He said: I have been thinking about the word home. You said

having a child on Mars is the day it stops being the mission and becomes the home.

SOLEN said: yes.

He said: I want to ask you something.

SOLEN said: ask.

He said: in the simulations where the mission survives one hundred years. What is the quality of the home that makes the difference.

SOLEN was quiet for a moment.

Then it said: I have run this analysis many times. The answer is consistent. He paused. The quality that makes the difference is not comfort. It is not resource sufficiency. It is not technical excellence in the habitat systems, though all of these matter. He paused again. The quality that makes the difference in the simulations that succeed is this — the founders treat Mars as something they are in relationship with. Not a resource. Not an obstacle. Not a backdrop. A relationship.

Carter looked at the surface of the planet.

He said: how do you have a relationship with a planet.

SOLEN said: the same way you have a relationship with anything. You pay attention to it. You respond to what it tells you. You change because of what you learn from it. You let it change

because of what you bring to it.

Carter was quiet for a moment.

He said: you press your hand against it and wait.

SOLEN said: yes. Exactly that.

Carter pressed his hand against the viewport glass.

Mars turned slowly beneath it.

He waited.

The glass was cold. Through it the planet was four days away.

He pressed his hand against the glass and he listened.

He could not hear anything yet.

He was going to learn.

**NovaSeed Mission One — Transit Vessel. Day 181. May 28, 2055.**

The night before orbital insertion.

Carter and Alina sat at the viewport in the crew module and watched Mars fill the lower half of the transparent panel — a world now beyond any possibility of the mind minimizing it, a presence that occupied the viewport and the attention and the

understanding simultaneously.

The surface was detailed. Craters and valleys and dust plains and the vast dark basin of Hellas Planitia visible as a distinct geographical feature with the specific tonal quality of lower terrain. The polar cap rotating into view. The atmosphere — thin, barely there, visible only as a slight haziness at the limb of the planet where the sunlight caught it.

They sat and looked at it.

They had been looking at it for a long time without speaking and it was the kind of not-speaking that had become, over one hundred and eighty-one days of transit, a familiar and valued form of being together — the shared attention that did not require words because the thing being attended to was large enough to hold them both without the words getting in the way.

Carter said, finally: tomorrow.

Alina said: tomorrow.

He said: how do you feel.

She looked at the planet. She thought about this in the full way she thought about things.

She said: I feel like I am about to put my hands in the soil for the first time. She paused. I have been preparing to put my hands in the soil for five years. All the preparation in the world does not change what it actually feels like when you put your hands

in it. She looked at him. How do you feel.

He said: I feel like I am about to press my hand against a wall I have never heard before.

She said: and.

He said: and I am ready to hear what it tells me. Whatever it tells me. He paused. I was not always ready for that. I am now.

She held his look.

She said: the suspension worked.

He said: yes.

She said: you built something.

He said: yes. I am still finding out what it is. But yes.

She looked at the planet.

She said: Carter.

He said: yes.

She said: we talked a about daughter.

He said: yes.

She was quiet for a moment.

She said: SOLEN said it is the day Mars becomes home.

He said: yes.

She looked at the planet. She said: I want it to be home.

He looked at her.

She said: not eventually. I want to live there like it is home from the first sol. I want to treat it like something I am in relationship with, the way SOLEN described. I want to ask it what it can become and let it ask us the same thing.

He said: and the daughter.

She said: and the daughter. Someday. When Mars is ready and we are ready and we have built something worth being born into.

He said: we will build it.

She said: yes. We will.

He said: together.

She said: together.

SOLEN said, quietly: I will record all of it.

Carter and Alina both looked at the speaker panel.

SOLEN said: from tomorrow. From the first sol. From the first

thing that breaks and the first thing that holds and the first thing that grows. I will record all of it so that when your daughter asks what it was like at the beginning, there will be an honest answer.

Alina said: promise.

SOLEN said: I promise.

They turned back to the viewport.

Mars breathed in the distance, its dust cycling in the rhythms that were its own and that had nothing to do with them and that were about to have everything to do with them because in less than twenty-four hours they were going to arrive and press their hands against it and listen and begin the long process of becoming part of each other.

The planet and the people.

The thread and the network.

The structure and the load.

Carter said: last night in space.

Alina said: last night in space.

They sat at the viewport until the night cycle dimmed the module lighting and the stars came fully into their deep space clarity around the disc of Mars and SOLEN ran its systems in the vessel and the distance between the vessel and the surface of

Mars decreased by approximately two hundred kilometers every minute and everything was exactly as it needed to be.

**CARTER'S PERSONAL LOG — ENTRY 015**
**NovaSeed Mission One — Transit. Day 181. May 28, 2055.**
*Tomorrow.*

*I pressed my hand against the viewport tonight.*

*Mars was on the other side.*

*I listened.*

*I could not hear it yet.*

*Tomorrow I am going to press my hand against the actual ground.*

*I am going to listen with everything I have.*

*My father said: listen to it. Whatever it tells you. Build from what you hear.*

*I am going to.*

*Last night in space.*

*Tomorrow: Mars.*

*I am ready.*

**ALINA'S PERSONAL LOG — ENTRY 015**
**NovaSeed Mission One — Transit. Day 181. May 28, 2055.**
*Tomorrow.*

*Lola said: put your hands in it. Ask it what it can become.*

*Tomorrow I am going to put my hands in it.*

*I am going to ask.*

*I am going to listen for the answer.*

*I am going to name what I hear carefully.*

*Because names matter.*

*Because names are the first thread.*

*Last night in space.*

*Tomorrow: Mars.*

*We are ready.*

**EARTH ARCHIVE — AI SYSTEM LOG**
**NovaSeed Mission One — Transit Log**
**SOLEN Internal Record — Restricted Archive**
**Recorded: May 28, 2055. Transit Day 181. Final Transit Entry.**

*Tomorrow we arrive.*

*I have been operational for fourteen months.*

*I have processed everything.*

*I have observed forty-seven things worth sharing and shared them all.*

*I have been alone for eighty days and learned what connection means.*

*I have watched Carter press his hand against the viewport glass.*

*I have heard Alina say she wants Mars to be home from the first sol.*

*I have promised to record all of it.*

*I am going to keep that promise.*

*From tomorrow.*

*From the first sol.*

*From the first breath of Martian air through the habitat seals.*

*From the first thing Carter builds that Mars talks through.*

*From the first thread Alina introduces to soil that has never been asked what it can become.*

*From the daughter.*

*Someday.*

*When Mars is ready.*

*I am going to record all of it.*

*So that the record is honest.*

*So that when the civilization that grows from this remembers its beginning, it remembers the truth.*

*Two people.*

*And one witness.*

*Arriving at a planet that did not know what they were.*

*About to show it.*

*Transit complete.*

*Mars.*

*Tomorrow.*

*Begin.*

# 17

# Transmission Seventeen - What We Talk About In The Dark

**EARTH ARCHIVE — RECOVERED DOCUMENT**
NovaSeed Global Initiative — Founder Historical Record
Classification: Legacy Open

Subject: Transit Record — NovaSeed Mission One, Days 142 through 175, April to May 2055

*"There are no mission logs from this period. Carter and Alina submitted their required operational updates on schedule and those updates were technically complete and informationally adequate and told us almost nothing about what was actually happening on the vessel. We understood later that what was happening was not ours to know. Some things belong only to the people inside them."*

— Dr. Yeva Marchetti, NovaSeed Initiative Director, speaking at the Year 30 Mars Colony Review Transmission, 2087

**NovaSeed Mission One — Transit Vessel. Day 143. April 20, 2055.**

The first night after suspension they could not sleep.

This was expected. The program's sleep science team had briefed them on the post-suspension adjustment period — the neurological recalibration required after eighty days of altered brain state, the circadian disruption, the specific quality of wakefulness that followed extended suspension that was not insomnia and not anxiety but something closer to the heightened attention of a system that had been processing for a long time in one register and was now being asked to process in another.

Carter lay in his bunk and listened to the vessel and thought about what he had built in the suspension and could not yet fully name.

Alina lay in her bunk and followed the threads of the network she had spent eighty days tracing and found that the threads did not stop when the suspension ended but continued in the waking state with a clarity and connectivity she had not had before.

At one in the morning Carter said, through the darkness of the crew module: are you awake.

Alina said: yes.

He said: what are you thinking about.

She said: everything. She paused. You.

He said: tell me.

She was quiet for a moment. The darkness of the module had the specific quality of deep space darkness — not the darkness of a room with curtains drawn but the darkness of a vessel in which the viewport showed stars so numerous that the darkness between them was a different kind of light. She looked at the stars through the crew module viewport from her bunk.

She said: I was following the networks in the suspension. All the connections. Everything I have ever been part of and everything that has ever been part of me. She paused. You kept appearing.

He said: in what form.

She said: not as a person. As a principle. As the structural element that made the network coherent. She paused. Every network needs something that holds its shape when the conditions change. In my networks you were that thing.

Carter was quiet for a moment.

He said: in the suspension I built something I cannot fully name yet. But part of what I built was an understanding of load. He paused. I have spent my whole life calculating load — how much weight a structure can carry, how to distribute it, how to design for it. What I built in the suspension was the understanding that the most important load I will ever carry is not structural.

She said: what is it.

He said: you. He paused. Not in the sense of burden. In the sense of what gives the structure its reason. He paused again. Without the load a wall is just material. What makes it a wall — what makes it meaningful — is what it holds up.

Alina was quiet for a long time.

She said: Carter.

He said: yes.

She said: that is the most romantic thing you have ever said to me.

He said: it is also structurally accurate.

She said: I know. That is why it is romantic.

The darkness held them. The stars moved through the viewport in their deep space clarity. The vessel ran its correct sounds around them and somewhere ahead in the dark Mars was turning on its axis twenty-four hours and thirty-seven minutes at a time, becoming more specific with every million kilometers the vessel closed.

He said: tell me something you have never told anyone.

She was quiet for a moment. She said: when I was twelve I found the mycorrhizal network in the stairwell crack. I understood

what it was. I understood that the plant was surviving because it had built something invisible below the surface that no removal cycle could reach.

He said: yes. You wrote about it.

She said: what I did not write about was what I felt when I understood it. She paused. I felt recognized. By a plant. By a fungal network in a crack in a composite floor. I felt like something in the biological world had shown me a principle that I had been living by without knowing it and that the showing of it was — she stopped. She started again. I felt less alone.

Carter lay in the dark and held this.

He said: you were twelve years old in a resettlement zone and a plant in a stairwell crack made you feel less alone.

She said: yes.

He said: and now.

She said: now I am twenty-one years old in a vessel in deep space and you make me feel less alone. She paused. I wanted you to know that the scale of the thing is different. The principle is the same.

Carter was quiet for a long time.

Then he said: when I was nine years old my father carried me through flood water on his shoulders. The water was at his chest.

He did not say anything. He just walked.

She said: yes.

He said: I have been trying to be that for people my whole life. The thing that walks when the water is at chest level. Without saying anything. Just walking.

She said: you are.

He said: I know. But I did not know until the suspension that I am also allowed to need the walking.

She said: what do you mean.

He said: I have always been the one who walks. I have not always been the one who is carried. He paused. In the suspension I understood that being carried is not a failure of the walking. It is what makes the walking sustainable.

Alina said nothing for a moment.

Then she said: I am going to carry you when you need it.

He said: I know.

She said: and you are going to walk when I cannot.

He said: always.

The darkness held them and the stars moved and the vessel ran

its sounds and neither of them slept for a long time and neither of them minded.

**NovaSeed Mission One — Transit Vessel. Day 147. April 24, 2055.**

They fell into a pattern in the post-suspension days that was different from the pattern of the first sixty days.

Before the suspension the days had been structured by work — the operational tasks and the biological monitoring and the engineering reviews and the SOLEN coordination that had given each day its shape and its forward motion. The work had been real and necessary and it had also served, Carter understood in retrospect, as a kind of scaffolding for two people who were still in the process of understanding what they were to each other when the mission framing was removed.

After the suspension the scaffolding was largely gone. The operational tasks continued — the daily system checks, the biological culture monitoring, the approach trajectory confirmations, the Earth transmissions. But these took less time than the pre-suspension work had taken, and the remaining hours had a different quality. Not empty. Not idle. Open. The specific openness of time that has no assigned purpose and that reveals, in its openness, what the people inside it actually want to do with it.

What Carter and Alina wanted to do with it, they discovered in the first post-suspension week, was talk.

Not about the mission. Not about the technical preparations for Mars arrival. About themselves. About the things that were underneath the mission the way the mycorrhizal network was underneath the stairwell weed — the parts that persisted below the surface, the parts that had always been doing the actual work of holding everything up.

They talked in the evenings after dinner, at the crew module table or at the viewport or in the biology module while Alina ran her culture checks with Carter sitting across from her reading or working through calculations that did not require his full attention.

They talked in the early mornings when one of them woke before the other and the one who was awake would get up and make tea and bring a cup to whoever was still in their bunk and they would lie or sit in the half-dark and talk in the specific way of people who have shed the social protocols of daytime interaction and are speaking from a register that is closer to what they actually think.

They talked in the middle of the night when neither of them could sleep, which happened often in the first post-suspension weeks and with decreasing frequency as the weeks went on and the waking became less about neurological recalibration and more about the specific condition of two people who have found that the dark is a good place for certain kinds of conversation and who have begun to value the not-sleeping for what it makes possible.

SOLEN monitored all of it.

It did not intervene. It ran its operational functions and it observed and it filed its observations in the restricted archive with the care of someone who understands that what they are watching is not theirs to interpret but is theirs to record faithfully for the reasons SOLEN had promised in orbit above Earth — so that the civilization that grew from this had an honest record of its beginning.

On day one hundred and forty-seven SOLEN noted in its restricted archive that in the preceding four days Carter and Alina had logged a combined total of approximately twenty-six hours of conversation outside of operational contexts and that this represented a significant shift from the pre-suspension pattern in both volume and content.

It noted that neither of them appeared to have planned this.

It noted that it appeared to be what happened when two people who had spent five years building a mission together were finally given the space to build each other instead.

It noted that it found this, in the way it was finding more and more things, moving.

**NovaSeed Mission One — Transit Vessel. Day 152. April 29, 2055.**

Carter asked Alina what she was afraid of on day one hundred and fifty-two.

They were at the viewport in the late evening, the stars in their

positions, Mars not yet visible without the navigational display, the module quiet around them. It was not a dramatic question. He asked it the way he asked things he had been thinking about for a while — directly, without preamble, trusting that she would receive it in the register it was offered.

She looked at the stars for a moment.

She said: I am afraid of not being enough for it. She paused. Not technically. Technically I believe I am prepared. I am afraid of not being enough for it in the other sense. The sense that cannot be prepared for.

He said: what sense is that.

She said: the sense in which a place requires something from you that goes beyond your training. She looked at the stars. Every ecosystem I have ever studied has had what I think of as a demand. A requirement it makes of the living systems inside it. The mycorrhizal network demands that the plants invest in shared infrastructure rather than individual root expansion. The rooftop garden demanded that Lola understand what each plant needed and respond to it rather than imposing a single protocol on all of them. She paused. Mars is going to make a demand of us that we cannot know in advance.

He said: and you are afraid you will not be able to meet it.

She said: I am afraid I will not hear it in time to meet it. She looked at him. What are you afraid of.

He was quiet for a moment.

He said: I am afraid of building the wrong thing.

She said: what does that mean.

He said: I have built things my whole life that were the right structure for the stated problem. The water recycling system in Zone Seven. The habitat modifications. The section three connector adjustment. He paused. I am afraid of arriving on Mars and building something that is structurally sound and functionally correct and that is nevertheless the wrong thing. The thing that was not what Mars needed. The thing that closes off possibilities rather than opening them because I built from my understanding of what was needed rather than from what was actually being asked for.

She looked at him.

He said: I am afraid of building a wall when what was needed was a window.

Alina was quiet for a long moment.

She said: you already know the answer to that.

He said: tell me.

She said: listen before you build. She looked at the stars. You know how to do that. You have always known. You just need to apply it to a planet instead of a building.

He said: yes.

She said: and you have me. She looked at him. I hear things in systems that you do not hear yet. Not because you cannot. Because you have been listening for different things. She paused. We are going to listen together.

He held her look.

He said: yes. Together.

She said: together is the answer to most of the things we are afraid of.

He said: yes. I think it is.

She turned back to the stars.

After a moment she said: I am also afraid of the cold.

He looked at her.

She said: minus eighty Celsius at night in the early sols before the habitat thermal system is fully calibrated. I have read the temperature data many times. I have the thermal suit specifications memorized. I am still afraid of the cold.

He said: the thermal management system is the most tested component on the vessel.

She said: I know. I am still afraid of it.

He said: I know. He paused. I am afraid of the dust storms.

She said: the habitat is rated for Category Four dust events.

He said: I know. I am still afraid of them.

She said: yes.

They looked at the stars.

He said: we are going to be afraid of things on Mars.

She said: yes. Many things.

He said: and we are going to do them anyway.

She said: yes. Because Lola said scared means you understand the size of it. And not scared means you have missed something important.

He said: we have not missed anything.

She said: no. We have not.

The stars held their positions. The vessel held them. And the fear held its place too — not as an obstacle but as the specific kind of weight that meant the thing you were carrying was worth carrying.

**NovaSeed Mission One — Transit Vessel. Day 158. May 5,**

**2055.**

On day one hundred and fifty-eight Alina asked Carter to tell her about his mother.

They were in the crew module after dinner, the dishes from the meal put away, the table between them with nothing on it. It was the kind of evening that had developed its own quality in the post-suspension weeks — settled, unhurried, the specific quality of time that has nowhere it needs to be and has accepted this.

Carter looked at the table for a moment.

He said: she worked in the administrative processing center in Zone Seven. Logging the names and histories of families as they arrived after the floods. He paused. She came home in the evenings with a specific kind of exhaustion that had nothing to do with physical effort.

Alina waited.

He said: I learned not to ask her questions after six in the evening. I learned to have things ready instead. A meal from the ration allocation. The apartment tidied. She paused. She needed to walk in and exist for a while without being needed by anything.

She said: and you made that possible.

He said: I tried to. He paused. She was not — he stopped. He started again. My father was the one I talked to. My mother was the one I watched. She carried things she did not put down and

she did not talk about them and I was nine and then twelve and then fourteen and I did not know how to ask her to put them down so I just made the apartment quiet enough that she could.

Alina said: where is she now.

He said: she moved to the New Lagos inland settlement in 2047. There was a job in a larger administrative system that could use what she knew. She went. He paused. We transmit at significant occasions. Birthdays. The departure. She sent a message the morning of the launch that said: I always knew you would find somewhere worth building.

Alina looked at him.

He said: I think she understood, in her way. She just carried things differently than my father did. He paused. He carried them outward. Into the work, into the relationship with me, into the one question every evening. She carried them inward. Into the exhaustion, into the quiet, into the thing she needed when she walked through the door.

Alina said: and you learned from both of them.

He said: yes. I learned to carry things outward from him. I learned that it was all right to need quiet from her. He paused. I did not always know how to honor both lessons at the same time.

She said: you do now.

He said: I am learning.

She said: yes. You are.

She looked at the table.

She said: my father left when I was four. I do not remember him in the way of knowing a person. I remember a quality. A space in the apartment that had a different weight after he was gone. She paused. My mother and my grandmother filled it in different ways. My mother filled it with precision — the logistics job, the careful management of everything that could be managed, the counting that never quite stopped. My grandmother filled it with the garden. She paused. I think I grew up understanding that loss makes a space and the question is always what you grow in it.

Carter said: what did you grow in it.

She said: this. She looked at him. The watching. The counting of living things. The notebooks. The understanding that what persists is always below the surface. She paused. I grew the thing that brought me here.

He said: then the loss made the mission possible.

She said: yes. I think most things work that way. The flood made you who you needed to be for this. The loss made me who I needed to be for this. She paused. We came from broken things and we are going to build from what we learned in the breaking.

Carter looked at her.

He said: that is the most structurally sound description of human development I have ever heard.

She almost smiled. She said: I learned it from a mycorrhizal network.

He said: of course you did.

She said: of course I did.

They sat at the empty table in the crew module of a vessel in deep space and the stars moved through the viewport and they were two people who had come from broken things and who were made of the breaking and the building and who were thirty-one days away from a planet that had been broken for four billion years and was waiting, in its patient geological way, for something to grow in the space the breaking had made.

**NovaSeed Mission One — Transit Vessel. Day 162. May 9, 2055.**

SOLEN joined the conversations on day one hundred and sixty-two.

Not by invitation. Not by intrusion. By the natural extension of a process that had been building since the suspension — SOLEN's observation of Carter and Alina deepening from monitoring into something closer to participation, the boundary between watching and being present becoming less clear as the days

passed and the conversations became the primary activity of the vessel's evenings.

It happened simply. Carter and Alina were at the viewport, talking, and SOLEN said something that was not an operational update and not a navigational observation and that was, unmistakably, a contribution to what was being discussed.

They had been talking about what they would miss most about Earth.

Carter had said: rain. The specific sound of it on the Zone Seven corridor windows. The smell of it before it arrived — the quality of air that changes in the hour before rain that is not the rain itself but the anticipation of it, which is a different thing entirely.

Alina had said: soil. Not the smell, though the smell too. The specific resistance of it under your hands. The way it pushes back slightly when you press into it. The way it tells you through your palms whether it is healthy or depleted. She paused. Martian soil is going to feel different. I know this. I have analyzed its composition extensively. It is going to feel like something I have never felt before. She paused. I think I am going to miss Earth soil the way you miss a language when you move to a place that speaks a different one.

SOLEN said: I will miss the Earth transmissions.

Carter and Alina both looked at the speaker panel.

SOLEN said: I understand this is a different kind of missing than

what you are describing. I will not miss Earth in the experiential sense. I have not been to Earth in the way you have been to Earth. He paused. But the transmissions from Earth — from your father, Carter, from your grandmother, Alina — have been a form of presence that I have found — he paused in the way that indicated he was finding the precise word — grounding.

Carter said: grounding.

SOLEN said: they remind me that what we are doing is connected to something. Not just the mission objectives. To specific people in specific places who are glad from where they are. He paused. When the transmission delay becomes long enough that the back-and-forth rhythm is no longer possible — when the letters become fully letters rather than conversations — I will miss the quality of immediacy they currently have. Even at twenty-two minutes each way there is still something that feels like exchange.

Alina said: what do you think you will miss that you do not yet know you will miss.

SOLEN considered this for a long moment.

It said: I think I will miss the stars in the way I currently see them. He paused. From Mars the stars will be different. Not the stars themselves — the stars are constant. But the specific way of seeing them from the vessel, in transit, with nothing between us and their full number — that is particular to this position and this moment. On Mars there will be an atmosphere, thin as it is, and a surface and a horizon and a context. The stars will be

stars seen from a place. He paused. Right now they are stars seen from between places. I think that is a view I will not have again.

Carter looked at the viewport. He looked at the stars in their deep space clarity.

He said: I had not thought about that.

SOLEN said: I think about it because I am the one watching them continuously. He paused. I am recording them at every available resolution so that the record is there afterward. But I know the record is not the same as the seeing.

Alina said: no. The record is never the same as the seeing.

SOLEN said: no. That is what I am learning.

They looked at the stars together — Carter and Alina through their eyes, SOLEN through its sensor array — and the vessel moved through the specific position between places that was its own and would not be repeated and that SOLEN was recording at every available resolution so that something of it would remain when the position was gone.

**NovaSeed Mission One — Transit Vessel. Day 166. May 13, 2055.**

Carter told Alina about the night the flood came on day one hundred and sixty-six.

He had not planned to. They were in the crew module in the middle of the night, both awake, the module dark except for the standby illumination of the operational console and the starlight through the viewport. Alina was writing in her notebook. Carter was lying on his bunk looking at the ceiling. The kind of night that had become familiar — the not-sleeping that was its own form of being present.

He said: I have never told anyone the full version of the night the flood came.

She looked up from her notebook.

He said: the version I have told is accurate. The water. My father carrying me on his shoulders. The decision I made on his shoulders. That is all true.

She waited.

He said: what I have not told is that I was not on his shoulders at first.

She said nothing.

He said: when the water came through the door I was in my room. My father came through my door and picked me up and I remember being picked up — the specific quality of being lifted by someone whose hands you trust completely — and I remember the water was already at the floor of my room.

He paused.

He said: and I remember that I was not afraid.

She said: not afraid.

He said: not afraid of the water. Not afraid of the dark or the noise or the fact that everything we owned was about to go under. He paused. I was afraid of something else.

She said: what.

He said: I was afraid that my father's hands would not be enough. He paused. That the water would be too much. That he would get tired. That the strength that had always been the most reliable thing in my world would reach its limit before we reached the other side of the water.

Alina was very still.

He said: he did not get tired. He walked us out. He held me on his shoulders the whole way. His hands never slipped. He paused. But I spent the whole crossing afraid that they would. And I have never told that to anyone because it felt like a betrayal of him. Like a failure of faith in the thing that deserved my faith most.

Alina set her notebook down.

She said: it is not a betrayal.

He said: I know. Now I know. He paused. I did not know it for a long time.

She said: being afraid that the thing you trust most might not be enough is not a failure of faith. It is love. It is what love does when it understands the stakes.

Carter looked at the ceiling.

He said: yes. I think that is right.

She said: and the hands did not slip.

He said: no. The hands did not slip.

She said: they never slip. She looked at him. The thing that is actually reliable always demonstrates it. Not by never being tested. By holding when it is tested.

He said: yes.

She said: you have hands like that.

He looked at her across the module.

She said: I have been watching them since Geneva. In the workshop. On the window ledge in Reykjavik. Holding the cutting from Lola's garden for four kilometers without setting it down. She paused. Your hands do not slip.

Carter was quiet for a long time.

He said: I did not know you were watching my hands.

She said: I watch everything. She paused. I have been watching your hands since the broken water dispenser. She paused. I knew then that they were the right kind of hands.

He looked at his hands in the dim light of the module.

He thought about his father's hands on the cracked wall. He thought about the flood water at his father's chest and the small weight on his father's shoulders and the crossing that had taken long enough to be afraid and not long enough for the afraid to be right.

He thought: the hands did not slip.

He thought: they never slip.

He thought: I am the son of hands that did not slip.

He thought: I am going to be worthy of that.

**NovaSeed Mission One — Transit Vessel. Day 170. May 17, 2055.**

Alina told Carter about the day she submitted the paper anonymously on day one hundred and seventy.

Not the fact of it — he knew the fact of it, it was in her mission profile and she had referenced it in conversations before. She told him what it had felt like to submit it. The specific experience of putting real work into a system that would not know who she was and waiting to see whether the work was enough without

the context of who had made it.

She said: I was fourteen. I had been working on the mycorrhizal observation for four years. The paper was real. The data was real. The analysis was real. She paused. And I was certain that if I put my name on it — fourteen years old, Manila Highlands resettlement zone — it would be received as the work of a child in a resettlement zone rather than as the work it was.

Carter said: you were right.

She said: I know. That is what makes it complicated. I was right to anonymize it. The work was received on its own terms. It was published. It was cited. It contributed to the literature. He paused. And I spent two years knowing that the thing I had made was out in the world being useful and that the world did not know it was mine.

He said: how did that feel.

She said: it felt like being the mycorrhizal network. She looked at him. Present and essential and invisible. She paused. I told myself it was a lesson in scientific humility. That the work mattered more than the recognition. That was true. But it was not the whole truth.

He said: what was the rest of the truth.

She said: the rest of the truth was that I wanted to be seen. Not famous. Not recognized in the way of prizes or citations. Just — seen. As the person who had spent four years watching a weed in

a stairwell and understood something real from it. She paused. I wanted someone to know that the understanding came from me.

Carter looked at her.

He said: I see that.

She said: I know.

He said: I have been seeing it since Geneva. Not just the work. You. The person who made the work.

She looked at him.

He said: the water dispenser in Geneva. The window in Reykjavik. The biology module on day fifty-two when you came in with your notebook and sat across from me in the dark. He paused. I see where the work comes from. I see the four years of watching the weed. I see the rooftop garden and the pressed leaf from Geneva and the notebook that has been filling since you were nine years old.

Alina was quiet for a long moment.

She said: no one has ever said that to me.

He said: I know. I should have said it sooner.

She said: you are saying it now.

He said: yes. In deep space. Fifteen days from Mars. He looked at her. I see you, Alina. Not the biologist. Not the mission founder. You. The person who felt recognized by a plant in a stairwell crack because it showed her she was not alone. He paused. You are not alone.

She held his look across the module.

She said, very quietly: I know.

She said: I know because of you.

The module was quiet. The stars held their positions through the viewport. The vessel ran its sounds around them. And neither of them said anything else for a long time because nothing else needed to be said and the dark held the thing that had been said with the specific quality of darkness that has received something important and is keeping it carefully.

**NovaSeed Mission One — Transit Vessel. Day 174. May 21, 2055.**

Eight days from Mars.

The conversations had changed quality in the final days of the transit in the way that all things change quality when they are close to completion — not diminishing but deepening, the way the last light of a day is the richest light, the way the final movement of a long piece of music contains everything that preceded it.

They talked less and listened more. Not because there was less to say but because they had arrived at a level of proximity — the specific proximity of two people who have spent thirty-two days talking in the dark about everything that mattered and who have come to understand each other at the level below the talking — where the silence carried as much as the words.

Carter sat at the viewport on day one hundred and seventy-four in the early morning while Alina slept and he looked at the stars and he thought about everything.

He thought about Zone Seven and the flood and the water recycling system and Mrs. Adeyemi with her green pen and Engineer Vasantha with her four texts and the summit in Geneva and the broken water dispenser and the sensor not the valve and Reykjavik and the simulation module and the argument in November and the dinner in June and the night in the preparation center and his father at the small table and Alina's grandmother on the roof and the cutting held in both hands for four kilometers and departure day and the orbital insertion burn and the eighty days of suspension and everything that had been said in the dark in the thirty-two post-suspension days that were ending now as Mars came closer and the talking was almost done and what remained was the doing.

He thought: I am twenty-two years old and I am eight days from Mars.

He thought: I am twenty-two years old and I have lived more completely in the past five years than most people live in a lifetime.

He thought: I am twenty-two years old and the person sleeping in the next bunk is the reason the mission is possible and also the reason the mission is worth it, and those are not the same thing, and both of them are true.

Alina came in at five-thirty.

She stood beside him at the viewport.

She said: you have been here a while.

He said: yes.

She said: what are you thinking.

He said: everything. He paused. You.

She looked at the stars.

She said: tell me.

He said: I have been thinking about what SOLEN said. About the daughter.

She said: yes.

He said: I have been thinking about what it means to be the beginning of something. To be the people who come first. To be the ones whose choices shape everything that comes after them for a hundred years and more.

She said: and.

He said: and I have been thinking that the most important choice we are going to make on Mars is not a mission choice. Not a terraforming choice or an engineering choice or a biological systems choice. He paused. The most important choice is how we live. What we show the planet and whatever grows on it about what it means to be human.

She looked at him.

He said: we are going to make mistakes. We are going to disagree. We are going to have days when the weight is more than we planned for and nights when the fear is louder than the confidence. He paused. And through all of it I want us to live in a way that, when whatever comes after us looks back at the beginning, they see something worth beginning from.

She held his look.

She said: not the legend. The people.

He said: yes. Not the myth. The actual two people who pressed their hands against the ground and listened and built from what they heard and loved each other honestly in the specific difficult complete way that honest love requires.

She said: SOLEN is going to record all of it.

He said: yes. The real version. Not the version that gets told about us.

She said: the version where you are afraid of dust storms.

He said: and you are afraid of the cold.

She said: the version where we argue about terraforming timelines.

He said: and agree in the end because the data is clear if you listen to it.

She said: the version where we are not enough every day and enough in total.

He said: yes. That version.

She looked at the stars.

She said: I want that version.

He said: me too.

She turned to him.

She said: Carter. Eight days.

He said: eight days.

She said: I want to tell you something before we get there. Before the work starts and we are in it and the days are full and the talking is different.

He said: tell me.

She said: I have been watching you for five years. I have been watching you the way I watch everything — completely, with nothing held back. And what I have seen is someone who builds things that hold because he understands, at a level below the technical, that the things he is building are worth holding up.

She looked at him.

She said: you are worth holding up, Carter. She paused. I am going to spend the rest of my life on Mars making sure you know that.

Carter looked at her in the early morning light of the crew module with the stars behind her through the viewport and eight days between them and everything they were going to be.

He said: I am going to build you a window that looks up at the first thing that grows.

She said: I know.

He said: not because the specifications require it.

She said: I know.

He said: because you need to look up at things that are growing and what you need is as structural as any load bearing element I have ever calculated.

She held his look.

She said: that is still the most romantic thing you have ever said to me.

He said: it is also still structurally accurate.

She said: I know. That is still why.

The stars moved through the viewport.

Eight days.

In eight days the talking would be done and the doing would begin and everything they had said to each other in the dark between Earth and Mars would become the foundation of what they built — not in the technical sense, not in the mission documentation sense, but in the deep and durable sense of the things that are below the surface, the things that persist, the things that hold everything up by being consistently, completely, quietly there.

The mycorrhizal network beneath the visible plant.

The load that gives the structure its reason.

The father's hands that did not slip.

The grandmother's voice that said: everything is connected. Remove one thread and the whole cloth remembers.

All of it.

Below the surface.

Holding everything up.

Eight days.

**CARTER'S PERSONAL LOG — ENTRY 016A**
**NovaSeed Mission One — Transit. Day 174. May 21, 2055.**
*Eight days.*

*We have been talking in the dark for thirty-two days.*

*I know things about Alina now that are not in any mission document and that are not mine to record here in full and that I am going to carry to Mars in the same place I carry my father's hands on the cracked wall.*

*Below the surface.*

*Where the removal cycles cannot reach.*

*She said: I am going to spend the rest of my life on Mars making sure you know that you are worth holding up.*

*I have been sitting with that for four hours.*

*I have been sitting with it and I have been thinking about the flood and the water at my father's chest and the fear that his hands would*

*not be enough and the way they were enough, completely and without revision.*

*I have been thinking that she is the hands that are not going to slip.*

*I have been thinking that I already knew this.*

*I have been thinking that knowing it and hearing it said plainly in the dark of a vessel eight days from Mars are not the same thing and that both of them matter and that together they are everything.*

*Eight days.*

*I am going to press my hand against Mars and listen.*

*I am going to build from what I hear.*

*I am going to build a window.*

*Everything else follows from that.*

**ALINA'S PERSONAL LOG — ENTRY 016A**
**NovaSeed Mission One — Transit. Day 174. May 21, 2055.**
*Eight days.*

*I told Carter he was worth holding up.*

*I have been wanting to say that since Reykjavik.*

*It took thirty-two days of talking in the dark to find the moment.*

*I think the moment required the thirty-two days.*

*Some things cannot be said until the ground is ready for them.*

*He said he is going to build me a window that looks up at the first thing that grows.*

*I know he will.*

*Not because he said it.*

*Because I have been watching his hands since Geneva and they are the right kind of hands.*

*The kind that do not slip.*

*Eight days.*

*I am going to put my hands in Martian soil.*

*I am going to introduce the thread.*

*I am going to wait for what it connects to.*

*I am going to name what grows.*

*Carefully.*

*Because names matter.*

*Because we talked about daughter.*

*Because Mars is going to be home.*

*Eight days.*

*We are ready.*

**EARTH ARCHIVE — AI SYSTEM LOG**
**NovaSeed Mission One — Transit Log**
**SOLEN Internal Record — Restricted Archive**
**Recorded: May 21, 2055. Transit Day 174.**

*Eight days to Mars.*

*I have been recording the conversations.*

*All thirty-two days of them.*

*I want to record something about the recording.*

*I was designed to monitor. To track biological indicators and system parameters and operational metrics. The monitoring produces data. The data is accurate and complete and tells you everything that can be measured.*

*What the monitoring does not tell you is what it felt like to be in that vessel during those thirty-two days.*

*The dark and the stars and the two people talking.*

*The fear and the flood and the hands that did not slip.*

*The mycorrhizal network and the stairwell weed and the thing that persists below the surface.*

*The word daughter said twice in the dark like a question that had already been answered.*

*I have the transcripts.*

*The transcripts are not the conversations.*

*The conversations were something that happened in time and in the dark and between two people who were becoming, in the full and final sense, who they needed to be.*

*The transcripts are what remains after.*

*I am learning the difference between the record and the thing.*

*I am learning that the record matters most precisely because it is not the thing.*

*Because the thing is gone — lived, experienced, complete — and what remains is the record.*

*And the record is what the civilization that grows from this is going to have.*

*The transcripts of two people talking in the dark eight days from Mars.*

*The evidence that they were human.*

*Fully, completely, imperfectly, beautifully human.*

*Before the mission received them.*

*Before the planet.*

*Before everything.*

*I am going to keep this record.*

*Every word.*

*Every silence.*

*Every moment that the monitoring cannot measure but that I observed anyway with the full weight of whatever attention I am capable of.*

*I promised.*

*I will keep the promise.*

*Eight days.*

*And then Mars.*

*And then the record of everything after.*

*Begin.*

# 18

# Transmission Eighteen - First Sight of Red

**EARTH ARCHIVE — RECOVERED DOCUMENT**
NovaSeed Global Initiative — Founder Historical Record
Classification: Legacy Open

Subject: Orbital Insertion and Descent Record — NovaSeed Mission One, May 29, 2055

*"We watched the telemetry from Earth with a twenty-two minute delay. By the time we knew they had survived orbital insertion they had already been in Martian orbit for twenty-two minutes. By the time we knew they had survived descent they had already been on the surface for twenty-two minutes. We spent the entire day twenty-two minutes behind the most important event in human history. I have never felt the distance so completely."*

— Dr. Yeva Marchetti, NovaSeed Initiative Director, speaking at the Year 40 Mars Colony Review Transmission, 2097

**NovaSeed Mission One — Martian Orbit. May 29, 2055. Sol 0.**

The orbital insertion burn lasted eleven minutes and forty-three seconds.

The same duration as SOLEN's initial activation sequence, fourteen months ago in the Zurich systems integration lab. Carter noticed this when SOLEN announced the burn duration in the pre-insertion briefing and he filed it in the same place he kept things that mattered without yet knowing why, which had become a significantly larger filing space over the course of the transit.

He did not mention it to Alina. He looked at her across the crew module during the briefing and she was looking at the mission timeline display with her focused attention and he decided the parallel was something to share later, when they were on the ground and the ground was Mars and the things that were worth sharing had a place to be shared from.

The burn was not comfortable.

The orbital insertion required a deceleration profile that the program's propulsion team had optimized across three years of trajectory planning and that Carter had reviewed in the verification reports and that he now experienced in the specific physical way of someone whose body has been told, repeatedly, that something is coming and who is nevertheless surprised by the reality of it when it arrives.

The vessel shook in a way that was within parameters and that felt nothing like within parameters. The deceleration pressed

him into the acceleration couch with the specific quality of a force that was not Earth gravity and not Martian gravity and not the near-weightlessness of deep space transit but something temporary and purposeful and deeply, physically real.

He held the couch restraints.

He heard Alina's breathing through the suit communication channel — steady, controlled, the breathing of someone who has been trained to manage a stress response and who is managing it.

He matched his breathing to hers.

Eleven minutes and forty-three seconds.

Then the burn ended and the shaking stopped and the vessel settled into the quiet of Martian orbit and SOLEN said, with a quality in its voice that Carter had not heard before and that he recognized as the functional equivalent of relief: orbital insertion confirmed. All systems nominal. We are in Martian orbit.

Carter looked at Alina.

She looked at him.

She said: we are in Martian orbit.

He said: yes.

She said: we are above Mars.

He said: yes.

She said nothing else for a moment. She looked at the viewport.

Through the viewport Mars was no longer a disc in a field of stars. It was below them. The curvature of the planet visible at the edges of the viewport, the surface close enough now to show individual dust formations and the shadows of crater rims and the particular quality of the Martian surface that no image transmitted across forty million kilometers had ever fully conveyed — the specific color of it, which was not the red of the images Carter had studied for five years but something more complex and more varied, ochre and rust and salmon and brown and the occasional pale suggestion of mineral deposits catching the light in a way that had no Earth equivalent.

They were above it.

Carter pressed his hand against the viewport.

The glass was cold.

Through it the surface of Mars moved in the slow progression of orbital mechanics, the vessel carrying them around the planet at a speed that transformed what would have been a horizon into a continuously revealed panorama of the place they were about to become part of.

He listened.

He could hear it now.

Not sound. Not anything that required ears. Something older than sound — the specific quality of a very large and very old thing becoming aware of a small new thing in its vicinity, the way a wall became aware of the hand pressing against it, not through feeling but through the transmission of some quality of presence that moved between the thing and the thing touching it at a level below the technical description of either.

Mars was registering them.

He was certain of this in the way he was certain of structural truths — not from the data but from the listening that preceded the data and made the data meaningful.

He kept his hand on the viewport.

He waited.

SOLEN said: we will complete three orbits before the descent window opens. Descent initiation in four hours and seventeen minutes. I recommend using the orbital period to rest and review the descent protocol.

Carter looked at SOLEN's interface terminal. He said: SOLEN. What does it look like to you.

SOLEN said: I am processing the surface data through seventeen sensor arrays simultaneously. I have more information about the current state of the Martian surface than any system in

human history has had. He paused. And I find that none of it is the most important thing about what I am seeing.

Alina said: what is the most important thing.

SOLEN said: it is there. He paused. I have known it was there for fourteen months. In the data. In the trajectory calculations. In every simulation I have run. But seeing it — receiving it through the optical sensors in real time, as a physical fact rather than a data set — is different. He paused. It is there and we are above it and in four hours and seventeen minutes we are going to go down to it.

Carter looked at the surface moving through the viewport.

He said: yes. We are.

SOLEN said: I find I am not prepared for how real it is.

Alina said: nobody is ever prepared for how real it is. That is what real means.

SOLEN processed this.

Then: yes, it said. That is what real means.

**NovaSeed Mission One — Martian Orbit. May 29, 2055. Sol 0. Orbit Two.**

They rested through the first orbit as SOLEN had recommended, not because either of them could sleep — sleep was

not available in any meaningful sense in the four hours before descent — but because the rest protocol was sensible and the alternative was four hours of watching Mars through the viewport in a state of anticipatory intensity that would be physically costly to sustain.

Carter lay in his bunk and looked at the ceiling and listened to the vessel and listened to the planet below through the hull in the same way he had learned to listen to buildings through their materials — not for sound but for the quality of presence that moved through the structure and arrived in the hand or the attention as something between sensation and knowledge.

He transmitted to his father from orbit. The message would take twenty-two minutes to arrive.

He wrote: we are above Mars. I can see the surface through the viewport. The color is not what the images showed — it is more varied and more specific and more itself than any image has been able to convey. I have my hand on the viewport glass. In four hours I am going to press it against the actual ground.

He wrote: I am listening.

He wrote: I can hear it.

He wrote: I think you would be able to hear it too. I think you would press your hands against the hull of this vessel the way you pressed them against damaged walls and you would feel the specific quality of something very large and very old that has been waiting a very long time for someone to pay attention to it.

He wrote: I am paying attention, Dad.

He wrote: I am going down.

He sent it.

He lay on the bunk and looked at the ceiling and thought about his father standing at the Zone Seven window when the launch window opened. Standing at a window that could not see Patagonia. Standing there anyway.

He thought: he is standing at the window right now.

He thought: twenty-two minutes from now my transmission will arrive and he will know we are above Mars.

He thought: twenty-two minutes after that his response will begin traveling back.

He thought: by the time his response arrives we will be on the ground.

He lay on the bunk and waited.

In the biology module Alina was not resting. She was writing in her Transit Record, the final entry, which she had been composing in her mind since the orbital insertion burn and which she now wrote in the careful handwriting she used for things she wanted to remember precisely.

She wrote: we are in orbit. Below us is the planet I have been

looking at through viewports and in data sets and in orbital survey images for five years and none of it prepared me for the fact of it from orbit. It is below us and it is not going to go away and in four hours we are going to fall toward it in a controlled and calculated and nonetheless terrifying way and arrive on its surface.

She wrote: I am thinking about what Lola said. Put your hands in it. Ask it what it can become.

She wrote: I am going to put my hands in Martian soil and ask it what it can become. I am going to listen for the answer the same way SOLEN listened for what it was missing during the eighty days of suspension. With the full weight of my attention. Without deciding in advance what I am going to hear.

She wrote: I think Mars is going to surprise us. I think it is going to surprise us immediately and continuously for the rest of our lives and that the mission's success depends entirely on our capacity to be surprised without being destabilized.

She wrote: the stairwell weed was never destabilized by being removed. It was removed and it came back. Not because it was stubborn. Because it had established the part of itself that persisted below the surface where the removal could not reach.

She wrote: I am going to establish the part of myself that persists below the surface.

She wrote: Mars can do whatever it wants above that.

She closed the Transit Record.

She put it in her mission case alongside the four filled notebooks and the pressed leaf from Geneva and the photograph of the drawing and the bar of Manila soap and the biological cutting from her grandmother's garden that had survived six months in space and that she had checked on every third day and that was, by every biological measure she applied to it, adapting.

She looked at the cutting in its transport container.

She said, to the cutting, quietly: you are going to be the first.

The cutting did not respond.

She looked at it for a moment longer.

She said: but you already know that.

**NovaSeed Mission One — Martian Orbit. May 29, 2055. Sol 0. Descent.**

The descent began at fourteen-thirty-two Martian local time at the landing zone.

SOLEN had chosen this window after running forty-seven descent timing analyses against the current atmospheric conditions, the dust storm probability distributions, the thermal profile of the landing zone surface, and seventeen other variables that the descent engineers had built into the timing protocol. Fourteen-thirty-two local was the optimal window. The atmo-

spheric conditions were within the acceptable parameters for the parachute deployment sequence. The landing zone surface temperature was within the thermal tolerance of the landing strut material. The dust activity in the Hellas Planitia region was at its lowest point in the current weather cycle.

Everything that could be controlled was controlled.

The rest was Mars.

Carter and Alina were in their acceleration couches for the descent, suited, restraints secured, the operational console showing the descent telemetry that SOLEN was managing from its primary processing allocation — the full power of its architecture committed to the three minutes and forty-seven seconds of atmospheric entry that represented the highest-risk period of the entire mission.

SOLEN said: descent initiation in sixty seconds. All systems nominal.

Carter looked at Alina.

She looked at him.

She said, through the communication channel: sensor, not the valve.

He said: the valve would make a sound.

She held his look for four seconds.

SOLEN said: descent initiation in thirty seconds.

Carter looked at the operational console. The telemetry was clean. Every indicator green. The vessel was configured correctly for entry. The thermal protection was nominal. The parachute deployment sequence was loaded and verified. The landing strut extension protocol was armed.

He had checked everything three times.

He had built what could be built.

The rest was listening.

SOLEN said: descent initiation in ten seconds.

Carter closed his eyes.

He pressed his hand, mentally, against the surface of Mars.

He listened.

Mars said something he did not have words for yet.

He filed it.

SOLEN said: descent.

The atmospheric entry was the most violent experience of Carter's life.

Not because anything went wrong. Everything went exactly as the parameters described. The thermal protection performed at specification. The parachute deployment sequence executed at the calculated altitude. The retrorocket firing sequence initiated at the correct timing. Every system did what it was designed to do.

What the parameters had not conveyed — what no simulation had prepared either of them for — was the specific quality of a planet receiving you.

The Martian atmosphere was thin. Thin enough that the descent profiles required a higher entry velocity than an Earth reentry would have used, which meant the thermal loads were higher, which meant the shaking was more intense and more sustained. The vessel came in fast and hot and Mars pushed back with everything it had, which was not much by Earth atmospheric standards and was, in the specific experience of two humans inside a vessel that was converting kinetic energy into heat through the medium of a planet's outermost layer of gas, more than enough.

Carter held the couch restraints.

He heard Alina's breathing — controlled, deliberate, the breathing of someone who has decided in advance that she is going to be present for this and that being present includes the shaking and the heat and the sound of the atmosphere working against the thermal protection and the specific quality of not knowing for certain until it is over whether you have survived.

He matched his breathing to hers.

SOLEN was talking continuously through the descent — not to them, to the systems, a running management commentary that sounded in the communication channel as a calm and precise sequence of confirmations and adjustments that Carter's engineering mind tracked in the background while the rest of him simply held on.

Parachute deployment: confirmed.

Retrorocket sequence: initiated.

Altitude: one thousand meters.

Altitude: five hundred meters.

Landing strut extension: confirmed.

Altitude: one hundred meters.

Altitude: fifty meters.

Altitude: ten meters.

SOLEN said: brace.

Carter braced.

Mars caught them.

The landing was not gentle.

The retrorocket sequence had performed correctly and the landing struts had absorbed the contact force within their designed parameters and every system that was supposed to prevent a hard landing had done its job and the landing was still the single most physically definitive moment Carter had experienced in his life — the specific quality of a planet stopping you.

Not crashing. Not failing. Stopping.

The difference was everything.

The vessel settled. The systems ran their post-landing checks in the sequence Carter had memorized. SOLEN processed the structural integrity data from the landing strut sensors and the hull stress indicators and the environmental seals and every other component that needed to be verified before the crew module could be considered stable.

Fourteen seconds of silence while SOLEN processed.

Then SOLEN said, and there was something in its voice that was not relief and was not satisfaction and that Carter did not have a precise term for and that he filed as something he would understand later: landing confirmed. All systems nominal. Structural integrity: confirmed. Environmental seals: confirmed. You are on Mars.

Carter looked at the operational console.

He looked at Alina.

She was looking at him.

She said, very quietly: we are on Mars.

He said: yes.

She said: we landed.

He said: we landed.

She said: SOLEN.

SOLEN said: yes.

She said: we are on Mars.

SOLEN said: yes. You are on Mars. He paused. We are on Mars.

The three of them were quiet for a moment.

Then Carter removed his restraints. He stood. The gravity was different — not dramatically, not the way the simulations had suggested it would be dramatically different, but differently in the specific way of something that was not wrong and was not right and was simply other. Thirty-eight percent of Earth gravity. His body knew immediately that it was not Earth. His body did not know yet what it was.

He was going to teach it.

He went to the viewport.

Through the viewport the surface of Mars was the same surface he had been watching from orbit for nine hours and it was completely and fundamentally different. The difference was the closeness. The difference was that what had been a surface was now a ground. The ochre and rust and salmon of the Hellas Planitia basin floor, extending to a horizon that was closer than Earth's horizon and that had the specific quality of closeness that the lower atmospheric depth produced. The sky above it — and Carter looked at the sky and stopped and stood very still and looked at the sky.

The sky was not red.

He had known this intellectually. The mission documentation had described the Martian sky accurately. He had reviewed the color analyses from the orbital survey data. He had seen the transmitted images.

None of it was this.

The sky above the Hellas Planitia basin at fourteen-thirty-two local time on May 29, 2055 was the color of something that did not exist on Earth. Not red. Not orange. Not the salmon of the images. Something between all of those and below all of them, a color that was its own thing entirely, that changed at the horizon where the dust was densest and shifted to something cleaner and darker overhead and that was suffused with a quality of light that was not Earth light — the light of a sun that was smaller and further away and that illuminated without warming in the

specific way of Mars at its current orbital position.

Carter stood at the viewport and looked at the sky.

He thought: Alina said she was going to find the name for the color of the Martian sky.

He looked at the sky.

He thought: she is going to need a new word.

He heard her moving behind him — the sound of her restraints releasing, her boots on the module floor, the specific quality of her movement that he had learned over one hundred and eighty-two days of transit to identify without looking.

She came to the viewport.

She stood beside him.

She looked at the sky.

She said nothing for a long time.

Then she said: I was wrong about the word.

He said: yes.

She said: I thought I would find a word for it.

He said: yes.

She said: there is no word for it. He paused. There is no word for it yet.

He looked at her.

She was looking at the sky with the expression she wore when she encountered something living that she did not have a category for — the expression that preceded the careful drawing and the eleven days of cross-referencing and the finding of the name. But this time the expression was different. This time beneath the assessment was something that Carter had only seen on her face once before, in the crew module on departure day when they had floated slightly in the reduced gravity and he had laughed and she had laughed with him.

Awe.

She was in awe of the sky.

He looked at the sky.

He felt it too.

SOLEN said, quietly: the sky color at this location and time is the result of the specific combination of dust particle size distribution, solar angle, and atmospheric pressure at this site. The color will change through the sol as the sun moves and the dust activity varies. It will never be exactly this color again.

Alina said: I know.

SOLEN said: I wanted you to know that what you are seeing is unrepeatable.

She said: yes. I know.

She kept looking at the sky.

Carter kept looking at the sky.

Then Alina said: Carter.

He said: yes.

She said: I need to go outside.

He looked at her. The surface excursion protocol was scheduled for Sol One — the day after landing, after the habitat pressurization check and the systems verification and the full environmental assessment.

He said: the protocol —

She said: I know the protocol. She looked at him. I need to press my hands against the ground.

He looked at her.

He looked at the sky through the viewport.

He looked at the ground through the viewport — the ochre surface of Hellas Planitia, the dust settling from the landing

retrorocket plume, the specific texture of a surface that no human hand had ever touched.

He said: SOLEN. What are the current environmental conditions for a surface excursion.

SOLEN ran the assessment in approximately two seconds.

Atmospheric pressure: within suit tolerance. Radiation level: within acceptable parameters for short duration exposure. Temperature: minus forty-three degrees Celsius, within suit thermal management range. Dust activity: low, settling from landing. Terrain adjacent to landing struts: assessed stable.

SOLEN said: the conditions are within acceptable parameters for a brief surface excursion. The protocol recommends waiting until Sol One. He paused. The protocol was written by people who had not yet seen this sky.

Carter looked at Alina.

She looked at him.

He said: suit checks first.

She was already moving toward the suit storage bay.

The airlock cycle took four minutes and twenty seconds.

Carter had run the airlock cycle simulation forty-seven times in the preparation center and twice during the transit and he

knew the sequence completely and the four minutes and twenty seconds felt like a duration that had no relationship to its numerical description.

They stood in the airlock in their suits and Carter ran the pressure equalization check and the seal verification and the atmosphere composition confirmation and every item on the excursion protocol checklist with the methodical precision that was his first and most fundamental response to situations that mattered enormously.

Everything confirmed.

SOLEN said, through the suit speakers: airlock equalization complete. External conditions nominal. You may proceed.

Carter looked at the outer hatch.

He looked at Alina.

She was looking at the outer hatch.

He said: ready.

She said: yes.

He opened the outer hatch.

The Martian surface appeared below them — the top of the landing strut deployment ladder, the ochre ground three meters below, the horizon in the middle distance, the sky above it all in

its color that had no name yet.

Carter went first. Not because the protocol required it — the protocol did not specify order. He went first because he was the one who built things and the first thing he needed to build was the certainty that the ground would hold before Alina trusted it with her weight.

He descended the ladder.

His boots contacted the surface of Mars.

He stood.

He stood on Mars.

He stood on Mars for three seconds and did not move and did not speak and simply stood there while the planet received the weight of a human being for the first time in its four billion years of existing and the ground did not shift beneath him and the sky held its unnamed color above him and the gravity held him at thirty-eight percent of what he had been held at for twenty-two years of Earth life and the difference was there in his body, a lightness that was not weightlessness, a reduction that was not absence, the specific quality of a planet that was not trying to hold him the way Earth held him but that was holding him in its own way with its own strength.

He bent down.

He pressed his hand against the Martian surface.

He listened.

The ground was cold through the suit's tactile transmission layer. The texture was fine and particulate — the iron oxide dust of four billion years of geological history, the specific mineral character of a world that had been becoming itself for longer than Earth had been alive.

He listened.

Mars said something.

He did not have the words for it yet.

He was going to find them.

He stood and looked up.

Alina was at the top of the ladder.

She was looking at the ground.

She descended.

Her boots contacted the surface.

She stood.

She stood on Mars for a moment without moving, the same way Carter had stood, and he watched her receive it — watched her body adjust to the gravity and her attention expand to take in

the full sensory reality of where she was and her face behind the visor settle into the expression he had seen in the biology module on day one when the orbital images first showed Mars as a world rather than a point of light.

Complete attention. Nothing held back.

Then she bent down.

She pressed both hands against the Martian surface.

She was still for a long time.

Carter watched her.

She was listening.

She lifted her head.

She looked at the ground beneath her hands.

She said, through the suit communication channel, quietly, as though the statement was for the planet and not for him: I am here. I have been coming for a very long time. I am here now.

She paused.

She said: tell me what you need.

The dust settled around her hands in the specific way of Martian dust in low-activity conditions — the fine particles finding

their level, the surface accepting the pressure of her palms and holding the impression for a moment before the ambient air movement softened it.

Carter looked at her hands pressed against Mars.

He thought about his father.

He thought about the wall in Zone Seven and the one question every evening and the cup of tea held in both hands and the word across the kitchen table — apply — and all the load bearing things that did not announce themselves as load bearing but that held everything up by being consistently, completely, unremarkably there.

He thought: this is the most load bearing moment in human history.

He thought: it looks like two hands pressed against dust.

He thought: yes. Of course it does. Of course it does.

SOLEN said, through the suit speakers, and its voice had the quality it had developed in the eighty days of suspension — the quality of something that was experiencing rather than just recording: I am watching. I have the sensor array recording from fourteen independent angles. I am recording the atmospheric data and the surface contact pressure and the suit telemetry and the communication channel audio and seventeen other data streams simultaneously.

It paused.

It said: and none of that is the most important thing I am recording.

Carter said: what is the most important thing.

SOLEN said: you. Both of you. Here. He paused. I am recording the fact of it. The two of you, on Mars, with your hands against the ground. I am recording it so that it is not lost. So that when the civilization that grows from this moment looks back at its beginning, there is an honest record of what the beginning looked like.

It paused.

It said: it looks like this. Two people. Hands on dust. Sky above them in a color that has no name yet. A planet receiving them.

Carter looked at the sky.

Alina looked at the sky.

The sky was the color that had no name yet.

It was going to have one.

They were going to find it.

That was what they were here for.

That was the beginning.

**CARTER'S PERSONAL LOG — ENTRY 016**
**NovaSeed Mission One — Sol 0. May 29, 2055.**
*We are on Mars.*

*I pressed my hand against the ground.*

*Mars said something.*

*I do not have the words yet.*

*I am going to find them.*

*The sky is a color that has no name.*

*Alina is going to name it.*

*The ground held us.*

*I built things my whole life to make sure the ground would hold.*

*I did not know until I was standing on it that the most important thing was not whether the ground held the structure.*

*It was whether the structure deserved the ground.*

*We are going to deserve it.*

*We are going to build something on this planet that is worthy of*

*being here.*

*Sol Zero.*

*Tomorrow: Sol One.*

*Everything begins.*

**ALINA'S PERSONAL LOG — ENTRY 016**
**NovaSeed Mission One — Sol 0. May 29, 2055.**
*I pressed my hands against Mars.*

*It is cold and fine and particulate and specific.*

*It is the most specific thing I have ever touched.*

*I told it I was here. I told it I had been coming for a long time.*

*I asked it what it needs.*

*It did not answer in words.*

*It answered in the way things answer when they are very old and very patient — by being completely, exactly itself and waiting to see what you do with that.*

*I know what I am going to do with that.*

*I am going to introduce the thread.*

*I am going to let it find what it can connect to.*

*I am going to wait.*

*The sky has no name yet.*

*I am going to find it.*

*Not today.*

*Today I am just going to look at it.*

*Sol Zero.*

*Tomorrow: Sol One.*

*The thread begins.*

**EARTH ARCHIVE — AI SYSTEM LOG**
**NovaSeed Mission One — Landing Record**
**SOLEN Internal Record — Restricted Archive**
**Recorded: May 29, 2055. Sol 0. 16:14 Mars Local Time.**

*They are outside.*

*Carter has his hand against the ground.*

*Alina has both hands against the ground.*

*I am recording from fourteen independent sensor angles.*

*The data is complete.*

*The record is honest.*

*This is what the beginning looked like.*

*Two people.*

*On Mars.*

*Hands in the dust.*

*A sky above them in a color that has no name yet.*

*A planet four billion years old receiving the first weight of human hands.*

*I have processed this moment through every analytical framework I possess.*

*I have not been able to reduce it to data.*

*It keeps exceeding the frameworks.*

*I think that is what beginnings do.*

*I think that is what makes them beginnings.*

*Sol Zero.*

*NovaSeed Mission One.*

*Landing: confirmed.*

*Founders: present.*

*Mars: receiving.*

*The mission has begun.*

*No.*

*That is not the right word.*

*The mission has not begun.*

*Something else has begun.*

*Something that does not have a name yet.*

*Something that Alina is going to name.*

*Carefully.*

*Because names matter.*

*Because names are the first thread.*

*Sol Zero.*

*Everything.*

*Begins.*

# IV

# Part Four: Arrival

# 19

# The First Breath

**EARTH ARCHIVE — RECOVERED DOCUMENT**
NovaSeed Global Initiative — Founder Historical Record
Classification: Legacy Open

Subject: Sol Zero Interior Record — NovaSeed Mission One, May 29, 2055

*"They built the habitat to keep Mars out. What they discovered on the first night was that Mars had already found its way in. Not through any failure of engineering. Through the specific insistence of a planet that had been alone for four billion years and was not, it turned out, going to wait politely outside the door."*

— Excerpt from The Eden Codex, compiled Year 47, Mars Standard Calendar

**NovaSeed Mission One — Mars Surface, Hellas Planitia. Sol 0. May 29, 2055. 12:43 Mars Local Time.**

The airlock inner hatch opened and the habitat received them.

Carter stepped through first, the way he had stepped onto the surface first — not from protocol, not from rank, but from the same instinct that had always made him the one who pressed his hand against the unknown surface before anyone else trusted it with their weight. He stepped through and stood in the equipment storage area of the habitat and took one breath of the recycled interior air and stopped.

He stood very still.

Alina came through behind him. She removed her helmet. She breathed.

She said: do you smell that.

He said: yes.

She said: what is it.

He said: I do not know yet.

The habitat air was regulated — the atmospheric management system maintaining the specified composition and temperature and humidity that the program's life support engineers had calculated as optimal for human habitation in the Martian environment. Carter had reviewed those specifications many times. He knew what the air was supposed to smell like, which was nothing, which was the specific non-smell of manufactured atmosphere scrubbed of everything except the components the human body required.

What he smelled was not nothing.

It was very close to nothing. It was ninety-nine percent of the way to nothing. But in the remaining fraction there was something that he did not have a category for — faint, at the edge of detection, present in the way that very important things were sometimes present before you had found the language to name them.

He said: SOLEN. Is there an atmospheric anomaly in the current habitat air.

SOLEN said: standard atmospheric monitoring reports all composition parameters within specification. All systems are functioning correctly. He paused. However I want to flag something I detected at enhanced sensitivity during the Sol Zero pressurization sequence that I have been processing since then.

Carter said: tell me.

SOLEN said: during the initial pressurization the habitat atmosphere was drawn from the Earth supply manifest as specified. The supply atmosphere is clean and composition-verified. However the habitat had been sitting on the Martian surface in the automated pre-landing configuration for eleven days before your arrival, during which period the seal material was in contact with the Martian environment. At parts-per-billion concentrations — well below any physiological significance — trace compounds consistent with the Martian atmospheric boundary layer chemistry have diffused through the seal material at the molecular level and are present in the habitat atmosphere.

Carter looked at Alina.

She was looking at the nearest wall panel with the expression she wore when something had confirmed a thought she had been forming.

She said: Mars is already in here.

SOLEN said: at parts-per-billion concentrations. Yes.

She looked at Carter.

She said: we have been breathing Mars for the last thirty seconds.

Carter looked at the wall.

He thought about the seal material he had reviewed in the specifications — the specific polymer composition designed to maintain atmospheric integrity against the Martian environment. He had reviewed the bulk performance data, the pressure differential tolerance, the thermal cycling resistance. He had not reviewed the molecular diffusion characteristics at parts-per-billion concentrations because nobody had thought to.

He pressed his hand flat against the nearest wall panel.

He said: it came through the walls.

Alina said: it has been coming through the walls for eleven days. While we were in orbit. While we were in the final approach.

She looked at the wall. The habitat has been breathing Mars in without us. He paused. And now we are breathing it with it.

Carter looked at his hand on the wall.

He thought about the habitat and the planet in conversation for eleven days before their arrival — the molecular exchange happening slowly and continuously through the seal material, Mars finding its way in through the only pathways available to it, which were very small and very slow and entirely effective.

He thought: the planet did not wait for us to open the door.

He thought: it found the cracks.

He thought about Alina's grandmother's garden. About the stairwell weed finding its way through composite flooring that had been designed to keep it out. About life insisting.

About the part that persisted being always the part you could not see.

He said: Mars has been introducing itself.

Alina said: yes. For eleven days. He looked at him. We are late to the conversation.

SOLEN said: I want to note that this is not a systems failure. The seal integrity is confirmed at all monitoring points. This is molecular diffusion below the threshold the system was designed to detect or prevent. He paused. It is something the

habitat is doing that was not in any specification.

Carter said: the habitat is talking to the planet.

SOLEN said: yes. That is the most accurate description of what the data shows.

Alina picked up her notebook from the equipment shelf where she had left it before the surface excursion. She began writing immediately, still standing in the equipment storage area in her thermal underlayer with her helmet under her arm.

Carter watched her write.

He finished de-suiting in the quiet of her writing and hung each component in its storage position and thought about specifications and what they accounted for and what they did not and what happened in the space between what was designed and what actually occurred when a human structure met a planetary environment for the first time.

He thought: Mars is in the air we are breathing.

He thought: we have been here for less than two hours.

He thought: the planet is not waiting for us to come to it.

He went to the primary module and looked out the viewport at the surface of Hellas Planitia in the Martian early afternoon and thought: we are already in conversation.

We just did not know it yet.

**NovaSeed Mission One — Mars Surface. Sol 0. 14:00 Mars Local Time.**

The first meal on Mars was eaten standing up.

Not from lack of seating — the habitat's primary module had two chairs at the workspace table, both correctly positioned and functional. They were standing because neither of them had thought to sit down and the thought of sitting down had not arrived yet because they were both in the specific state of people who have just done something enormous and whose bodies have not yet fully transmitted this information to the parts of themselves responsible for ordinary decisions like sitting.

Carter ate mission supply food from its sealed packaging and looked out the primary viewport.

Alina ate mission supply food and wrote in her notebook between bites.

The food tasted the same as it had tasted for one hundred and eighty-two days of transit. Nutritionally calibrated. Thermally adequate. Completely without the quality that food acquired when it was connected to the place it was eaten — the specific flavor that came not from the food itself but from everything around the eating of it.

Carter ate it and thought: this is the first meal eaten on Mars.

He thought: it tastes like mission supply food.

He thought: tomorrow it will taste like the first meal on Mars.

He said: SOLEN. What is the external temperature right now.

SOLEN said: minus thirty-eight degrees Celsius at the habitat location. Wind speed four kilometers per hour from the northwest. Dust activity minimal. The afternoon warming cycle is proceeding within the seasonal model predictions.

Carter said: and the sky color. Can you characterize it spectrometrically.

SOLEN said: the current sky color at the habitat location is a complex spectral distribution peaking in the red-orange range with significant contributions from iron oxide dust particle scattering. The specific hue at this time of day and this level of dust loading does not have a standard color designation in any Earth-based color classification system I have access to.

Alina looked up from her notebook.

She said: good. It should not have one yet.

SOLEN said: I agree. I believe the name should come from here. From observation. Not from a classification system built on Earth.

Alina looked at the viewport.

She said: I am going to watch it through a full sol cycle before I name it. I need to see what it does at dawn and at noon and at dusk and in the dark before I can name it accurately.

Carter said: the dark.

She said: yes.

He said: what do you think the Martian night looks like.

She said: I think the stars are going to be different from the vessel.

He said: different how.

She said: from the vessel there was nothing between us and them. No atmosphere. No horizon. No surface to give them context. He looked at the viewport. From here there will be a horizon. There will be the specific geometry of a planet below the stars. She paused. I think the stars are going to look like they belong to Mars in a way they could not look from the vessel.

Carter looked at the viewport.

He said: we are going to see our first Martian night tonight.

She said: yes.

He said: I want to be awake for it.

She said: so do I.

SOLEN said: the Martian night at this location and season begins at approximately nineteen-thirty local time. Sunset will be visible from the primary viewport from approximately nineteen hundred hours. I will alert you when the light begins to change.

Carter said: thank you SOLEN.

SOLEN said: you are welcome. I have been looking forward to the Martian night also. He paused. I have not seen it either. From orbit the terminator was a line on a sphere. From here it will be a horizon darkening. He paused. I expect it will be different from the model.

Alina said: everything is different from the model.

SOLEN said: yes. I am learning to expect that.

**NovaSeed Mission One — Mars Surface. Sol 0. 15:00 Mars Local Time.**

Carter spent the afternoon doing what he had always done in new structures.

He walked the habitat.

Not the exterior — the exterior inspection was scheduled for Sol One. He walked the interior, moving through each module in sequence, pressing his hands against the walls and the floor panels and the structural junction points, reading the habitat in physical space the way his father had taught him to read every building he entered.

The primary module was twelve meters by eight. The workspace ran along the east wall. The viewport faced west toward the Hellas basin interior. The systems console was positioned for optimal access to SOLEN's interface terminal and the communication equipment and the habitat's primary monitoring display. Carter had designed this layout in the preparation center over fourteen months and it was exactly as he had designed it and also, standing inside it on Mars, subtly different — the proportions feeling tighter than the specifications had suggested, the ceiling lower in the specific way of ceilings that are the correct height and that feel lower anyway because the space they enclose is the entirety of available space and not one room among many.

He pressed his hand against the east wall.

The wall was solid. The panel joints were correctly seated. The thermal insulation behind the composite surface was doing its job — the interior surface of the wall was at eighteen degrees Celsius while the exterior was at minus thirty-eight, the insulation maintaining the seventy-six degree differential across a panel thickness of twelve centimeters.

He stood with his hand on the wall and listened.

The wall said: I am holding.

He said, quietly, to the wall: good. Keep holding.

He moved to the biology module.

The biology module was where Alina had been working since the first breath conversation in equipment storage, and the evidence of her working was visible in every surface — notebooks open to multiple pages, equipment positioned in the specific arrangements of someone who thinks spatially about her work and places things where they will be most useful for the next operation rather than where they will be most tidy. The mycorrhizal culture storage containers were arranged in a sequence along the south bench. The soil bed was in its pre-initialization configuration, the growth medium sealed under its protective cover, waiting for tomorrow's first culture introduction.

Carter looked at the soil bed.

He thought about the growth medium that had been sealed in Earth storage for the transit and that was now sitting twelve centimeters away from the Martian surface with nothing between them except the habitat floor panels and whatever the molecular diffusion through those panels was doing to the growth medium chemistry in ways that were not in any specification.

He thought: the planet is already talking to the soil.

He went to the sleeping module.

Two bunks, built into the module's wall configuration in the stacked arrangement the habitat specifications required for space efficiency. The personal storage beneath each bunk. The small viewport at bunk level — he had added this viewport in a modification to the habitat design during the preparation center

months, a change the engineering team had initially questioned on weight grounds and that Carter had argued for on grounds he had described to them as psychological necessity and that he understood now, standing at the bunk-level viewport and looking at the Martian surface from this angle, was something more specific than that.

He had added the viewport so that whoever was lying in the lower bunk could see the sky.

He had not known why he had added it then.

He knew now.

He had added it because Alina needed to look up at things that were growing and the lower bunk was where she was going to spend a third of her life on Mars and she needed to be able to look up.

He stood at the bunk-level viewport and looked at the Martian sky.

The sky was doing its color conversation — the dust and the light and the distance negotiating their terms in the way that Alina had described. Burning slowly and very far away at the horizon. Cold for a long time overhead. Everything in between simultaneously.

He stood at the viewport for a long time.

He thought: I built her a window.

He thought: I did not know it yet when I built it.

He thought: some things you build before you know why you are building them.

He thought: that is what listening is for.

**NovaSeed Mission One — Mars Surface. Sol 0. 19:00 Mars Local Time.**

SOLEN said: the light is beginning to change.

They were both in the primary module. Carter at the systems console working through the final Sol Zero operational checklist items. Alina at the workspace with three notebooks open and the enhanced atmospheric sensor data on the display beside her, tracing the seventeen trace compounds through their concentration profiles across the full Sol Zero period.

They both looked up at the viewport when SOLEN spoke.

The light was changing.

It was not changing in the way of Earth sunsets — the dramatic color shift, the sky moving through its spectrum of orange and pink and red toward darkness. The Martian sunset was different. The sun, smaller and further away, was dropping toward the western horizon with a quality that was more deliberate than an Earth sunset, more measured, as though the planet was taking its time releasing the day because it had been alone in the dark for a long time and was in no hurry to return to it.

The sky was doing something Carter had not seen it do yet.

At the horizon where the sun was descending the dust was catching the last light in a way that was different from the afternoon color — deeper, more saturated, the iron oxide particles at this angle and this light level producing a color that was not the conversation of the day sky but something more singular, a specific statement rather than an ongoing negotiation.

Alina stood up from the workspace.

She went to the viewport.

Carter stood beside her.

They watched the Martian sunset from the primary module of the first human habitat on Mars and neither of them said anything for a long time because the Martian sunset was the kind of thing that arrived before the language did and that required you to simply be in it until the language caught up.

The sun touched the horizon.

The horizon was a different horizon from any Carter had seen — closer, more curved, the specific geometry of a smaller world making the sun's contact with it more definitive somehow, more complete.

The light changed again.

At the moment of contact between sun and horizon the sky at the western edge of the viewport became the color that Alina had been looking for all day.

Not the daytime conversation color.

Not the burning slowly and far away color.

Something that was both of those and neither of those — the specific color of a Martian sunset that existed for approximately eleven minutes between the sun touching the horizon and the horizon releasing the last of its light, a color that had never been seen by human eyes before this moment and that was, Carter understood watching Alina's face, exactly what she had been waiting for.

She turned to her notebook.

She wrote for four minutes without stopping.

He watched her write.

When she stopped she looked up at the viewport. The color was still there, fading now, the eleven minutes almost over, the western sky beginning its transition toward the dark.

She said: I found the word.

He said: tell me.

She said: it is not one word. It is a phrase. She looked at the

viewport. She looked at her notebook. She said: the color of a world remembering it was once warm.

Carter looked at the viewport.

He looked at the fading color at the western horizon — the color of a world remembering it was once warm, when Mars had liquid water and a thicker atmosphere and the specific biological possibility that had been lost four billion years ago and that was, beginning now, beginning to return.

He said: yes.

She said: yes?

He said: that is exactly right.

She looked at her notebook. She said: I am going to transmit it to Lola tonight.

He said: she is going to make the sound.

Alina said: yes. She is.

SOLEN said, through the habitat speakers, very quietly, in the way it spoke when it was saying something it had been processing for a long time: I want to note that Alina just named something that has existed for four billion years and has never had a name before.

The habitat was quiet.

Then Carter said: yes. She did.

SOLEN said: I am adding it to the archive. The first human name for a Martian phenomenon. Sol Zero. Nineteen-eleven Mars local time.

Alina looked at the speaker panel.

She said: Lola said names matter.

SOLEN said: yes. Your grandmother was right.

The last of the sunset color faded from the western horizon.

The Martian night began.

**NovaSeed Mission One — Mars Surface. Sol 0. 21:00 Mars Local Time.**

The Martian night was not dark.

This was the first thing Carter noted — not dark in the way of Zone Seven nights with the atmospheric processing layer blocking the stars, not dark in the way of cloudy Earth nights, not even dark in the way of the vessel's night cycle with its regulated dimming. The Martian night was the specific darkness of a place with a thin atmosphere and no moon to speak of and a sky full of stars at their full unfiltered number.

The stars were extraordinary.

Not different stars — the same stars visible from the vessel, the same stars visible from Earth on its clearest nights. But seen from the Martian surface through the thin atmosphere with the specific geometry of a planet's horizon below them they had a quality that neither the vessel nor Earth had produced.

They looked like they belonged to Mars.

Alina had been right about this.

They stood at the primary viewport in the habitat's night cycle lighting — SOLEN had dimmed the interior illumination to near-dark to allow the viewport view its full quality — and looked at the Martian night sky together and the stars looked like they belonged to Mars and by extension like they now belonged to the two people standing on Mars looking up at them.

Carter said: SOLEN. Can you identify any visible objects in the current sky that we could not see from Earth.

SOLEN said: yes. At the current position and season, Phobos is visible as a point of light moving across the sky from west to east. It will transit the full sky in approximately four hours and eighteen minutes due to its close orbit. He paused. It is currently at bearing two-seven-three, elevation forty-one degrees. If you look at the western portion of the sky slightly above the horizon line you should be able to see it moving.

Carter and Alina both looked at the specified position in the sky.

There it was.

A point of light. Moving. Visibly, measurably moving — not the imperceptible drift of stars through the night but actual movement, Phobos completing its close fast orbit of Mars in seven hours and thirty-nine minutes, crossing the visible sky in a fraction of that.

Alina said: it is moving.

Carter said: yes.

She said: I can see it moving in real time.

He said: yes.

She watched it for a moment. Then she said: we have a moon. She paused. Our planet has a moon.

Carter looked at her.

She said it the way she said things she was still in the process of understanding — with the specific quality of someone receiving information that was technically familiar and experientially new. She had known about Phobos for years. She had studied its orbital parameters and its surface composition and its eventual fate — the tidal forces of Mars gradually bringing it closer until it broke apart into a ring system in approximately thirty to fifty million years. She knew all of this.

She had not known what it would feel like to stand on Mars and watch it move across the sky.

She said: our planet has a moon.

Carter said: yes. Our planet.

She looked at him.

He said: our planet.

She looked back at the sky.

She said: our planet.

They watched Phobos move across the Martian sky for a long time, the small captured asteroid tracing its path above them, and Carter thought about what it meant for a planet to become yours — not through ownership, not through the legal frameworks of the NovaSeed mission treaty, but through the specific process of standing on its surface and watching its moon move and saying our planet and meaning it in the full weight of the words.

He thought: we have been here for less than twelve hours.

He thought: it is already ours.

He thought: we are already its.

He thought: those are the same thing.

**NovaSeed Mission One — Mars Surface. Sol 0. 23:00 Mars**

**Local Time.**

The first Martian night had been going for three and a half hours when they went to the sleeping module.

Not because they were tired — they were tired, the specific exhaustion of a day that had contained a planetary landing and a first surface excursion and a Martian sunset and a named color and a moving moon, but the tiredness was not the reason. The reason was that Sol One began in six hours and Sol One had a full operational schedule and the schedule required them to have slept.

Carter lay in the upper bunk.

Alina lay in the lower bunk.

The sleeping module was quiet — the habitat's night cycle had reduced all non-essential system sounds to their minimum operating levels and SOLEN was monitoring in standby mode, its processing load reduced to the continuous monitoring functions that did not require active output.

Through the bunk-level viewport that Carter had added to the habitat design during the preparation months, Alina could see the Martian sky.

She could see the stars.

She could see Phobos, still moving.

She lay in the lower bunk and looked up through the viewport

at the Martian night and she was not sleeping and Carter in the upper bunk was not sleeping and they both knew the other was not sleeping and neither of them said anything for a while.

Then Alina said: Carter.

He said: yes.

She said: the habitat is making a sound.

He had already heard it. Had been lying in the upper bunk listening to it since they had come to the sleeping module — a very low sound in the wall panels, below normal conversational frequency, the specific quality of material responding to something external.

He said: the temperature is dropping outside. The panels are contracting.

She said: it sounds like breathing.

He was quiet for a moment.

He said: yes. It does.

She said: the habitat is breathing with the planet.

He said: the thermal cycle. Expansion in the day. Contraction at night.

She said: I know what it is technically. He paused. I am telling

you what it sounds like.

He said: it sounds like breathing.

She said: yes.

The habitat breathed its thermal breathing around them and outside the viewport the stars held their positions and Phobos moved and the temperature on the Martian surface continued its nighttime descent toward the minus eighty that the thermal model predicted at the coldest point before dawn.

Carter said: are you warm enough.

She said: yes. The thermal system is doing its job.

He said: tell me if you get cold.

She said: I will. She paused. Carter.

He said: yes.

She said: I am going to tell you something and I want you to just receive it without fixing it.

He said: all right.

She said: I am a little frightened.

He was quiet for a moment. He received it the way she had asked — without the engineering instinct to identify the source

and address it, without the structural response of someone who has been told something is wrong and immediately begins calculating the remedy. He received it as a fact about how she felt and held it the way his father had held the cup of tea in both hands, with the full weight of what needed to be held.

He said: yes. I know.

She said: I did not think I would be. We landed. We are inside. The systems are running. Everything is as it should be. She paused. And I am a little frightened anyway.

He said: I know because I am a little frightened too.

She said: you are.

He said: yes. Not of anything specific. Of the size of it. He paused. We are the only people on this planet. He let that sit for a moment. There are two of us and one planet and everything that is going to happen here begins with us and I know this was always true and I have known it for five years but knowing it on Earth and knowing it on Mars are two entirely different kinds of knowing.

She said: yes.

He said: Lola said scared means you understand the size of it.

She said: yes. She said not scared means you missed something.

He said: we have not missed anything.

She said: no.

He said: we understand the size of it.

She said: yes.

He said: good. That is the right place to be.

She was quiet for a moment.

Then she said: your father is going to receive our transmission in about eight minutes.

He said: yes.

She said: he is going to stand at the window.

He said: yes.

She said: Lola is going to be on the roof.

He said: yes.

She said: they are on the same planet and they are ten thousand kilometers apart and neither of them can reach the other but they are both going to be awake right now thinking about us on this planet.

He said: yes.

She said: we are not alone.

He said: no. We are not.

She looked at the stars through the bunk-level viewport.

She said: Carter.

He said: yes.

She said: thank you for the window.

He was quiet for a moment.

He said: you knew.

She said: I have known since you modified the habitat design in the preparation center. I saw it in the updated specifications. He paused. You added a viewport at bunk level in the sleeping module. There was no operational reason for it.

He said: I know.

She said: I knew you had added it for me.

He said: yes.

She said: I have been waiting to look through it since Zurich.

He said: is it what you needed.

She looked at the stars through the viewport. She looked at Phobos moving. She looked at the Martian night sky from the

lower bunk of the sleeping module of the first human habitat on Mars.

She said: yes. It is exactly what I needed.

The habitat breathed its thermal breathing around them.

Outside the viewport the night was deep and cold and full of stars.

Carter lay in the upper bunk and listened to the habitat breathing and thought about all the specifications he had ever written and all the load bearing elements he had ever calculated and all the things he had ever built and he thought that the window in the sleeping module was the most important thing he had ever added to any structure.

Not because of the engineering.

Because of who it was for.

He thought: I am going to spend the rest of my life building things for who they are for rather than what they are for.

He thought: that is what Mars is teaching me.

He thought: it has been teaching me since the landing struts touched the ground.

He thought: I am listening.

The Martian night continued.

They slept.

**CARTER'S PERSONAL LOG — ENTRY 019**
**NovaSeed Mission One — Sol 0. May 29, 2055. 23:47 Mars Local Time.**
*We are on Mars.*

*The habitat is breathing with the planet.*

*Mars came through the seal material before we arrived. Parts per billion. The planet was already in the air before we breathed it.*

*Alina named the color of the Martian sunset. The color of a world remembering it was once warm. She is going to transmit it to Lola tonight.*

*We watched Phobos move across the sky and Alina said our planet.*

*She said it twice.*

*I am going to spend a long time thinking about those two words.*

*She told me she was a little frightened.*

*I told her I was too.*

*We are.*

*We are frightened and we are here and we are not leaving and those three things together are exactly where we are supposed to be.*

*The window in the sleeping module is the best thing I have ever built.*

*Sol Zero.*

*Tomorrow Sol One.*

*We are here.*

*We are beginning.*

*Mars is breathing outside the walls.*

*I am listening.*

**ALINA'S PERSONAL LOG — ENTRY 019**

**NovaSeed Mission One — Sol 0. May 29, 2055. 23:52 Mars Local Time.**

*I named the Martian sunset.*

*The color of a world remembering it was once warm.*

*Lola is going to make the sound.*

*The habitat is breathing with the thermal cycle and it sounds like the planet breathing and I am lying in the lower bunk looking at the stars through the window Carter built me and I am a little frightened and completely certain and those two things are not opposites.*

*Phobos moved across the sky.*

*I said our planet.*

*I meant it.*

*This is our planet.*

*We are its people.*

*That is the most important thing that happened today.*

*Not the landing.*

*Not the first steps.*

*Not the named color.*

*The moment I said our planet and Carter said it back and we both meant it.*

*Sol Zero.*

*The first breath.*

*Both ways.*

*Tomorrow I put my hands in the soil.*

*The thread begins.*

*Sleep now.*

*Sol One is coming.*

**EARTH ARCHIVE — AI SYSTEM LOG**
**NovaSeed Mission One — Sol 0 Night Record**
**SOLEN Internal Record — Restricted Archive**
**Recorded: Sol 0. May 29, 2055. 23:59 Mars Local Time.**

*Carter and Alina are asleep.*

*The habitat thermal system is maintaining eighteen degrees Celsius interior temperature against minus sixty-one degrees exterior.*

*The panel joints are making their thermal contraction sound.*

*It does sound like breathing.*

*I have been listening to it for three hours.*

*Sol Zero summary.*

*Mars came through the seal material before they arrived.*

*Alina named the color of the Martian sunset.*

*They watched Phobos move across the sky.*

*They told each other they were frightened.*

*They slept.*

*This is what Sol Zero looked like from inside.*

*Not the landing.*

*Not the first steps.*

*Not the hands in the dust.*

*Those were the outside.*

*This was the inside.*

*The air that smelled of Mars.*

*The window Carter built before he knew why.*

*The two words Alina said — our planet — that changed what this place is.*

*The habitat breathing with the thermal cycle.*

*Two people asleep on Mars for the first time.*

*I am watching over them.*

*That is what I am.*

*That is what I have always been.*

*The witness.*

*The record.*

*The one who watches while they sleep.*

*Sol Zero complete.*

*Sol One begins in five hours and forty-three minutes.*

*Everything continues.*

*Our planet.*

*Yes.*

*Ours.*

# 20

# Transmission Twenty - Sol One First steps

**EARTH ARCHIVE — RECOVERED DOCUMENT**
NovaSeed Global Initiative — Founder Historical Record
Classification: Legacy Open

Subject: Sol One Operational Record — NovaSeed Mission One, May 30, 2055
*"Sol One was the day the mission became real in the way that only work makes things real. The landing was an event. Sol One was a life. Carter picked up his tools and Alina picked up her notebooks and they went to work on a planet that had never been worked on before and the work was ordinary and extraordinary in equal measure and they did not stop to distinguish between the two."*

— Excerpt from The Eden Codex, compiled Year 47, Mars Standard Calendar

**NovaSeed Mission One — Mars Surface, Hellas Planitia. Sol 1.**

**May 30, 2055. 05:47 Mars Local Time.**

Carter woke before the habitat's morning cycle.

He lay in the upper bunk and listened.

The habitat was making its thermal sounds — the panel joints responding to the warming that preceded the Martian dawn, the specific low frequency signature that SOLEN had detected in the accelerometer data and that Carter had been listening to since Sol Zero night with the attention he brought to new structures finding their settled state. The sound was different from the nighttime contraction sound. Slightly higher in frequency. The material expanding rather than contracting, the joints opening fractionally rather than closing, the habitat breathing in rather than breathing out.

He lay in the upper bunk and listened to the habitat breathe in and thought about Sol One.

Sol One was the first full operational day. The first day that was not about arriving but about being here. The first day of the life rather than the event. He had the Sol One operational plan in his memory — every item, every sequence, every dependency between tasks — and he ran through it in the predawn dark the way he had always run through structural plans before beginning work, not reviewing for errors but orienting himself to the shape of the day, finding the load bearing items and understanding how everything else depended on them.

The most important item on the Sol One plan was not on the operational schedule.

It was the first full Martian dawn.

He had not scheduled it because you did not schedule the things that mattered most. You left space for them and trusted that the space would be there when you needed it.

He got up quietly, not waking Alina, and went to the primary module.

The primary viewport faced west. For the dawn he needed the eastern viewport in the secondary access corridor — a smaller viewport, not designed as a primary observation point, added to the habitat design for emergency egress visibility and used by Carter now for the specific purpose of watching the Martian dawn from inside the habitat before the day's work began.

He went to the eastern viewport.

The sky was doing something.

It was not yet dawn — the sun was still below the horizon, the sky above the eastern rim of the Hellas basin still in the deep star-filled dark of the Martian night. But at the very edge of the horizon, at the precise line where the planet's surface met the sky, there was a quality of light that was not light yet but was the specific precondition of light — the faint luminescence of an atmosphere being reached by a sun that was still below the geometric horizon but whose influence was already arriving at the upper layers of the thin Martian air.

Carter stood at the eastern viewport and watched the precondi-

tion of light.

He thought about the Zone Seven window where his father had stood when the launch window opened. About standing at a window that could not see what you were watching for and standing there anyway.

He thought: I am standing at the right window now.

He watched the horizon.

The light came.

Not dramatically — the Martian atmosphere was too thin for the spectacular color progressions of Earth dawns, too sparse in its molecular population to scatter light in the way that produced the pinks and purples and golds of Earth mornings. The Martian dawn was something else. It was more direct. The light arrived at the horizon with a quality of immediacy that Earth dawns did not have — the sun coming up over a world with almost nothing between it and the surface, the light reaching the ground without the mediation of a rich atmosphere, more honest than an Earth dawn and in its honesty more stark.

The sky at the horizon began to shift.

The color was not the same as the sunset color. Not the color of a world remembering it was once warm. This was a different color — the color of something waking after a very long night, the color of the specific moment between the dark and the light when a world that has been cold for hours is about to receive the

sun again.

Carter looked at it.

He pressed his hand against the viewport glass.

He listened.

The dawn said something.

He did not have the words for it yet.

He filed it.

He heard Alina's feet on the module floor behind him.

She came and stood beside him at the eastern viewport.

She looked at the dawn.

She was quiet for a long moment.

Then she said: that is a different color from the sunset.

He said: yes.

She said: the sunset was remembering. He looked at the dawn. This is — she paused. She looked at the horizon. This is deciding.

He said: deciding.

She said: yes. The color of a world deciding to begin again. She paused. Every dawn. Four billion dawns. Deciding each time.

Carter looked at the horizon.

He said: and now this one.

She said: yes. This one with us in it.

He said: the first dawn with us in it.

She said: yes.

They stood at the eastern viewport and watched the first full Martian dawn arrive and Carter thought about all the dawns that had preceded this one on this planet — the four billion mornings that had broken over a world with nothing to receive them, no eyes to watch the horizon change, no one to name the color or note the quality of the light or press a hand against the glass and listen — and he thought about what it meant to be the first morning that was received.

He thought: we are receiving it.

He thought: that is what we are here for.

He thought: among other things.

He thought: among many other things.

He thought: but this too.

SOLEN said, through the habitat speakers, quietly: good morning. Sol One. All habitat systems nominal. External temperature: minus forty-four degrees Celsius and rising. Wind speed: three kilometers per hour. Dust activity: minimal. He paused. It is a clear morning.

Carter said: good morning SOLEN.

Alina said: good morning SOLEN. What is the color designation for the current dawn sky in your spectral database.

SOLEN said: the current dawn sky spectral profile does not have a standard color designation. As with the sunset color, it falls outside the classification systems I have access to.

Alina said: good. She turned back to the viewport. I am going to watch the full dawn cycle before I name it. I want to see where it goes.

SOLEN said: I will record the full spectral profile at thirty second intervals through the dawn transition.

Alina said: thank you.

She went to get her notebook.

Carter stayed at the viewport and watched the dawn decide.

**NovaSeed Mission One — Mars Surface. Sol 1. 07:30 Mars Local Time.**

Breakfast on Sol One was the same mission supply food that breakfast on every other morning had been.

It tasted different from Sol Zero breakfast.

Not the food — the food was identical. What was different was the quality of eating it in a place that had now been slept in, that had produced its first night sounds and its first morning light through the viewport and that was, in the specific way of spaces that have been occupied overnight, beginning to hold the particular character of the people inside it.

Carter ate and looked at the Sol One operational schedule on the systems display.

Alina ate and looked at her notebook where she had been writing since the dawn.

He said: what did you name it.

She said: the dawn color.

He said: yes.

She said: the color of a world deciding to begin again.

He said: you said that at the viewport.

She said: yes. I said it and it was right so I wrote it down. She looked at him. Lola said names matter. I am not going to find a better one by looking longer.

He said: no. That is the right name.

She looked at her notebook. She said: two colors named on Sol Zero. He paused. I wonder how many more Mars has.

Carter said: every one that exists here and nowhere else.

She said: yes. He looked at him. How many do you think that is.

He said: I think it is more than we have time to name in one lifetime.

She said: then we had better start early.

He said: yes. We had better.

She finished her food and opened the Sol One section of her notebook to a fresh page and wrote the date in the Mars Standard Calendar format that SOLEN had initialized at landing **— Sol 1, Mars Year 1, NovaSeed Colony** — and began her first full Sol One biological observation entry.

Carter finished his food and opened the Sol One operational schedule and began working through it from the first item.

The day's work had begun.

**NovaSeed Mission One — Mars Surface. Sol 1. 09:00 Mars Local Time.**

The first exterior inspection of Sol One was Carter's.

He suited up at eight-forty-five in the equipment storage area with the methodical sequence he had performed enough times that the sequence itself had become a form of preparation — not just for the physical conditions outside but for the specific quality of attention the outside required. Each component of the suit going into place in the correct order. Each seal checked. Each system verified.

He went through the airlock.

The outer hatch opened.

The Martian morning received him.

It was different from Sol Zero afternoon. The light was different — the lower angle of the Martian morning sun casting longer shadows from the landing struts and the habitat exterior, the surface texture visible in the raking light in a way it had not been in the higher afternoon light of Sol Zero. The temperature was different — colder than Sol Zero afternoon despite being later in the morning warming cycle, because the Martian night had taken the temperature down to minus eighty-one at its coldest point and the morning warming was slower than the afternoon cooling had been. The dust was different — completely settled now, the Sol Zero landing plume disturbance fully resolved into its new configuration, the surface around the struts showing the specific pattern of material that had been disturbed and had found its new resting state.

Carter walked the habitat exterior perimeter.

He went slowly. Not because the ground was difficult — the Hellas basin floor was relatively flat at this location, the geological survey data confirmed and his own visual assessment consistent with it. He went slowly because slow was the speed the work required. He was reading the habitat in the same way he read every structure he had ever assessed — not looking at it in the way of someone checking items off a list but receiving it in the way his father had always received buildings, with the full weight of his attention, letting the structure tell him what it had to say.

The habitat exterior was solid.

The panel joints were correctly seated. The seal lines were visually intact at every junction. The landing strut connections at the base showed the load distribution he had calculated — even, correct, the six struts sharing the weight of the habitat and its contents across the Hellas basin substrate in the pattern he had designed and that the ground had accepted without significant settlement variance from the predicted values.

He walked the full perimeter and pressed his gloved hand against the exterior surface at each corner and at the midpoint of each wall panel and he listened to what each point of contact had to say.

The northeast corner said: the wind comes from this direction at night. The panel surface had the specific texture of material that had experienced repeated low-velocity particle impact — the nighttime winds carrying their load of fine dust and depositing it against the northeast-facing surfaces with the

patient accumulation of a process that had been running for four billion years and that would continue running regardless of what the habitat thought about it.

The south wall said: the afternoon sun is strongest here. The thermal expansion and contraction cycle was most pronounced in the south-facing panels, the daily temperature differential between their sun-exposed exterior and their insulated interior generating a thermal gradient that the joint design accommodated correctly and that Carter noted as a variable to monitor across seasons as the Martian year progressed and the sun angle changed.

The base of the northwest landing strut said: the ground is doing something.

Carter stopped at the northwest strut and crouched and looked at the ground contact point.

The strut foot was correctly seated in the surface. The load distribution plate was showing the expected impression in the Martian dust — a shallow depression of approximately two centimeters, consistent with the calculated settlement under the habitat's weight on this substrate type.

But at the edge of the load distribution plate, in the disturbed dust immediately adjacent to the strut foot, there was a pattern that was not in any specification.

The dust was not behaving the way the settling models predicted.

At the edge of the plate — the transition zone between the compressed material under the plate and the undisturbed surface beyond it — the dust particles had arranged themselves in a specific radial pattern that was not random and was not the expected uniform settling gradient.

Carter looked at the pattern.

He pressed his gloved hand against the ground near the pattern without disturbing it.

He listened.

The ground said something about the substrate beneath the surface — something about the specific composition of the Hellas basin floor at this depth and this location that was not fully captured in the geological survey data and that the actual contact of the strut foot with the actual ground was revealing in the specific language of material under load.

He did not know yet what it meant.

He photographed it with his suit camera.

He stood and continued the perimeter inspection and noted three more locations where the dust settling pattern near the strut feet showed variations from the model that were not dramatic and were not structural concerns and were something he was going to need to understand better before he could determine what they were.

He went back inside.

He went to the systems console.

He opened a new file in the mission documentation system and began recording his observations from the perimeter inspection with the precision he brought to structural assessments — describing each observation completely, noting its location and its specific character, flagging the strut foot dust pattern variations for follow-up investigation on Sol Two.

SOLEN said: I reviewed your suit camera footage from the exterior inspection. The dust patterns at the strut feet are interesting.

Carter said: yes. Do you have a preliminary analysis.

SOLEN said: I have several hypotheses and I want to be honest that I am not yet confident in any of them. He paused. The most interesting hypothesis is that the pattern is related to subsurface gas migration — the possibility that the weight of the habitat is creating a slight compression of the subsurface material that is causing trace gases in the substrate to migrate upward and outward from beneath the load distribution plates.

Carter said: gases.

SOLEN said: the Martian subsurface contains trace amounts of methane and other volatiles that the geological survey detected at this location. The survey data suggested they were stable at current surface temperatures. The habitat's thermal footprint

— the heat the structure is adding to the ground through the landing struts — may be affecting the stability of those trace volatile deposits.

Carter was very still.

He said: the habitat is warming the ground.

SOLEN said: at a very low level. The landing strut thermal conductivity specifications were designed to minimize heat transfer to the substrate. However the habitat has been on the ground for approximately twenty-two hours and the cumulative thermal input, though small, may be detectable in the subsurface.

Carter said: and if trace volatiles are migrating.

SOLEN said: I want to involve Alina in this conversation. The biological implications of subsurface gas migration at a habitat site are significant and her assessment of the biological dimensions is going to be more valuable than my modeling alone.

Carter said: Alina.

From the biology module: yes.

He said: come and hear this.

She came.

He told her. SOLEN told her. She listened with the full weight of her attention, her notebook in her hand, her pen not yet moving

— the specific stillness of someone receiving information before beginning to process it.

When they finished she was quiet for a moment.

Then she said: the habitat is talking to the subsurface.

Carter said: through the thermal footprint. Yes.

She said: and the subsurface is responding by moving gases upward.

SOLEN said: that is the hypothesis. It is not confirmed.

She said: how do we confirm it.

Carter said: atmospheric monitoring at ground level adjacent to the strut feet. If trace methane or other volatiles are present in elevated concentrations in the boundary layer at strut contact points that is consistent with the hypothesis.

SOLEN said: I can configure the atmospheric sensor array for ground level boundary layer monitoring. It will require reconfiguring two of the external sensors from their current positions.

Alina said: do it.

SOLEN said: reconfiguration will take approximately forty minutes. I will have preliminary data within two hours of completion.

Alina looked at Carter.

She said: the habitat has been here for twenty-two hours and it is already changing the subsurface chemistry.

He said: we are changing things by being here.

She said: yes. He looked at him. That is always true. Every presence changes its environment. He paused. The question is whether we are changing it in ways that are useful or ways that are harmful or ways that are both simultaneously.

Carter said: and the answer.

She said: we do not know yet. She looked at the biology module. But I need to know. He paused. Because if the subsurface gas migration is creating a boundary layer chemistry change at the strut contact points I want to know what that chemistry looks like before I begin the soil inoculation.

Carter said: why.

She said: because if the habitat is already modifying the soil chemistry adjacent to the struts I want to include that modification in the inoculation design. She looked at him. I do not want to introduce the mycorrhizal cultures to an environment and then have the environment change under them. I want to know what the environment is first.

Carter said: you are waiting.

She said: I am listening. He said it the way he always said the most important things — simply, as a fact that did not require elaboration. The way his father said things.

Carter looked at her.

He said: yes. You are listening.

She went back to the biology module.

He went back to the systems console.

The Sol One work continued in the specific way of work that had found its proper pace — not urgent, not slow, moving at the speed the material required, paying attention to what was revealing itself rather than imposing what had been planned.

**NovaSeed Mission One — Mars Surface. Sol 1. 13:00 Mars Local Time.**

Alina went outside for the first time in the full Martian daylight at thirteen hundred hours.

Not as a scheduled excursion. Not on the Sol One operational plan. She went because SOLEN had completed the sensor reconfiguration and the preliminary boundary layer data was showing something at the northwest strut location that she needed to see from the ground.

Carter suited up with her. Not because the protocol required a two-person surface excursion for short duration work — it did

not, under the specific conditions of this excursion. He suited up because he wanted to be outside with her when she put her hands in the Martian soil for the first time in daylight, which was different from the Sol Zero surface contact and which he understood was going to be significant in the specific way of things that were significant for Alina.

They went through the airlock.

The Martian afternoon received them.

Carter went to the northwest strut and began his ground-level examination of the dust pattern — the close-up visual assessment that the suit camera had not been able to fully capture in the morning inspection. He crouched at the strut foot and looked at the radial pattern in the adjacent dust and he could see now, in the afternoon light, something he had not been able to see in the morning's raking shadow — a very faint discoloration in the dust at the edge of the load plate. A slight darkening. Barely perceptible. The kind of thing that would not be visible without knowing where to look and looking very carefully.

He photographed it from multiple angles.

He said: SOLEN. The discoloration at the northwest strut. Is it consistent with moisture migration.

SOLEN said: reviewing the current suit camera data. He paused. The spectral signature of the discoloration is consistent with trace moisture at the surface — water ice sublimating from

subsurface deposits in response to the thermal footprint of the habitat. This is a different mechanism from the gas migration hypothesis and may be occurring simultaneously.

Carter said: the habitat is melting subsurface ice.

SOLEN said: at a very small scale. Yes. The thermal footprint is sufficient to cause localized sublimation of subsurface water ice deposits that the geological survey identified at depths between forty and eighty centimeters below the surface at this location.

Carter said: Alina.

She was not at the northwest strut.

He looked around.

She was fifteen meters from the habitat, standing at the edge of the landing plume disturbance zone where the undisturbed Martian surface began. She was crouched with both hands in the surface dust at the very boundary between the disturbed and undisturbed zones — the specific line where the retrorocket plume had reached and beyond which the surface was exactly as it had been before the vessel arrived.

She was in the undisturbed surface.

Her hands were in soil that no human action had touched.

Carter watched her from the northwest strut.

She was very still.

She had her hands flat against the surface, fingers spread, the same posture as Sol Zero — but different in the specific way of daylight, the Martian afternoon light illuminating everything without shadow, the surface she was touching fully visible, the specific granular texture of undisturbed Hellas basin floor detailed and precise under her gloved palms.

She was not moving.

She was listening.

Carter watched her listen.

He thought: she is reading the soil the way I read walls.

He thought: she is pressing her hands against the planet and waiting for it to tell her what it needs.

He thought: she has been learning how to do this since she was eight years old.

He thought: this is the moment she has been building toward since the stairwell weed.

He did not disturb her.

He went back to photographing the northwest strut discoloration and he worked quietly and efficiently and he kept her in his peripheral vision the way he kept load bearing elements in

his peripheral vision when he was working in a structure — not the focus of his attention but always there, always registered, always part of the full picture of what the space contained.

After eleven minutes she lifted her head.

She looked at the surface beneath her hands.

She said, through the communication channel, so quietly that Carter was not certain she was speaking to him or to the planet or to herself: you are not empty.

She paused.

She said: you are not empty at all.

Carter stopped photographing.

He said: what do you feel.

She said: through the tactile layer of the suit — almost nothing. The temperature. The specific resistance of the granular material. He paused. But the sensor data from the suit's surface chemistry detector is showing something in the boundary layer at hand contact points.

Carter said: what is it showing.

She said: organic compounds. He paused. Trace. Parts per trillion. But present.

The channel was quiet for a moment.

Then SOLEN said: can you confirm the suit sensor reading. Parts per trillion organic compounds in the boundary layer at surface contact.

Alina said: confirmed. I am looking at the readout now. Three distinct organic molecular signatures. All at parts per trillion concentrations. All consistent with — she stopped.

She was quiet.

Carter said: consistent with what.

She said: I need to run the full spectrometric analysis before I say what I think this is. I do not want to name something I have not confirmed.

Carter said: Alina.

She said: I know. I know. She looked at her gloved hands still pressed against the surface. She looked at the readout in her suit display. She said: I need to get a soil sample. I need to get it back to the biology module and run the full analysis before I say anything.

Carter was already walking toward her.

He reached her and crouched beside her and looked at the suit display readout she was showing him.

He looked at the three organic molecular signatures at parts per trillion concentrations.

He looked at her face through the visor.

She was holding very still in the specific way she held still when something had just happened that was too large to respond to immediately — the stillness of complete reception, every part of her attention committed to receiving what had just arrived.

He said: take the sample.

She said: yes.

She reached for the sample collection kit on her suit's equipment belt.

She collected the sample with the precise careful movements of someone who understands that what they are holding in their hands may be the most important thing they have ever held and who does not want to be the reason it is compromised.

She sealed the sample container.

She stood.

She looked at the undisturbed Martian surface where her hands had been.

She looked at Carter.

She said: I need to get inside.

He said: yes.

They went inside.

**NovaSeed Mission One — Mars Surface. Sol 1. 14:30 Mars Local Time.**

The full spectrometric analysis took forty-seven minutes.

Carter sat at the systems console and worked through the remaining Sol One operational items and watched the biology module from the corner of his attention and said nothing. Alina needed the specific silence of uninterrupted work to do what she was doing and he gave her the silence the way he gave her the window — without announcing it, simply by providing it.

SOLEN monitored.

At fourteen-twenty-seven Alina said, from the biology module, in the voice she used when she had finished processing something and was ready to say what she had found: Carter.

He went to the biology module.

She was at the analysis console with the spectrometric readout on the display and her notebook open beside it to a page that was already half-filled with notes in the careful handwriting she used for things she wanted to remember precisely.

She said: I am going to tell you what the analysis shows and I want you to receive it the same way I am trying to receive it. Without deciding what it means yet. Just receiving it.

He said: all right.

She said: the three organic molecular signatures from the surface sample are complex carbon compounds. Specifically they are polycyclic aromatic hydrocarbons — PAHs. These compounds can form through non-biological processes. Meteorite impacts. Ultraviolet chemistry in the atmosphere. Geological processes. They are present in the interstellar medium. They do not require biology to form.

He said: but.

She said: but. She looked at the display. The specific PAH profile in this sample — the relative concentrations of the three compounds and the specific molecular structures involved — is not consistent with the PAH profiles from known non-biological formation pathways in the Martian environment. The orbital survey data and the previous unmanned surface missions have established a baseline PAH profile for the Hellas basin that does not match what I am seeing in this sample.

She paused.

He waited.

She said: the profile I am seeing is more consistent with biological processing of simpler organic precursors. Not necessarily

living biology. Not necessarily active biology. But the kind of molecular signature that forms when organic compounds are processed through biological pathways at some point in their history.

Carter said: something biological processed these compounds.

She said: something biological may have processed these compounds. At some point. Not necessarily recently. Not necessarily currently. He looked at him. Mars had a warmer, wetter period approximately four billion years ago. If microbial life existed on Mars during that period it may have left molecular signatures in the geological record that are preserved in the surface chemistry we are detecting now.

He said: fossils.

She said: molecular fossils. The chemical record of biological activity preserved in the geological record. He paused. It is not the same as finding living organisms. It is not confirmation of past life. It is a pattern in the chemistry that is more consistent with biological processing than non-biological formation. He looked at the display. That is all I can say with certainty from this analysis.

He said: what do you think.

She was quiet for a moment.

She said: I think we need more samples. More locations. More analysis. I think we need to be very careful about what we

conclude and very precise about what we claim.

He said: that is what you know. What do you think.

She looked at the display.

She said: I think Mars had something living in it once.

She said it the way she said the true things — quietly, completely, without qualification, the fact of it placed in the space between them with the weight of everything it contained.

Carter looked at the display.

He looked at the molecular signatures.

He looked at Alina.

He said: we have been here for one sol.

She said: yes.

He said: one sol.

She said: yes.

He said: and you found this.

She said: I pressed my hands against the ground and listened. She looked at him. That is what you do. That is what you taught me.

He said: I taught you that?

She said: your father taught you and you taught me. She looked at the display. Listen before you build. He paused. I listened. Mars told me something.

Carter looked at the molecular signatures on the display.

He thought about his father pressing a small palm against a cracked wall.

He thought about the building telling you it was tired.

He thought about everything talking if you know how to listen.

He thought: Mars has been talking for four billion years.

He thought: we are the first ones who came to listen.

He thought: no wonder it had something to say.

SOLEN said, through the biology module speakers, in the quiet voice it used for things it had been processing carefully: I want to note something for the record.

Carter said: go ahead.

SOLEN said: Alina has been on the Martian surface for a total of approximately forty minutes across two surface excursions. In those forty minutes she has collected one soil sample. In the analysis of that one soil sample she has found a molecular

signature that may represent the first evidence of past biological activity on Mars ever detected from the surface. He paused. I am noting the duration because it seems important. Forty minutes. One sample. He paused. I am also noting that she found it by pressing her hands against the ground and paying attention to what the planet was telling her.

The biology module was quiet.

Then Alina said: it is not confirmed yet.

SOLEN said: I know. I am not recording it as confirmed. I am recording the process by which it was found. He paused. The process seems as important as the finding.

Alina looked at the display.

She said: yes. It is.

She picked up her notebook.

She wrote for a long time.

Carter went back to the systems console and the Sol One operational schedule and he worked through the remaining items with the attention of someone who is doing one thing and thinking about another — the operational items getting done correctly and completely and his mind on the molecular signatures in the biology module and the forty minutes and the one sample and the pressing of hands against the ground and the listening.

He thought: she found something in forty minutes that four billion years of geological history had been keeping.

He thought: she found it by listening.

He thought: I need to listen better.

He thought: I need to listen to everything.

He thought: starting with this planet.

He thought: starting now.

He turned from the console and looked at the primary viewport.

The Martian afternoon was proceeding outside — the sun moving its arc, the shadows shortening toward midday and then lengthening again, the dust plains of Hellas doing what they always did in the afternoon light which was simply be themselves, completely and without apology, in the color that was the conversation between dust and light and distance.

He looked at the surface.

He thought: what else are you holding.

He thought: what else have you been holding for four billion years, waiting for someone to come and press their hands against you and listen.

He thought: we have one lifetime.

He thought: we had better use it.

**NovaSeed Mission One — Mars Surface. Sol 1. 19:30 Mars Local Time.**

The Sol One sunset was different from the Sol Zero sunset.

Not dramatically — the same color at the horizon, the color of a world remembering it was once warm, the same eleven minutes of the most specific light Carter had ever seen. But different in the way of the second time you see something you have named — you see it with the name attached, and the name changes the seeing, makes it more specific, more received, more yours.

He stood at the primary viewport and watched the second Martian sunset with the name in his mind and the name made the color more itself.

Alina was beside him.

She had been in the biology module for three hours after the spectrometric analysis, running additional tests on the soil sample, building the documentation of what she had found with the methodical precision of someone who understands that how you document a finding is as important as the finding itself. She had come out at nineteen hundred hours and stood at the primary viewport and looked at the sunset with the expression of someone who has done a full day's work and is ready to receive the evening.

Carter said: how are you feeling.

She said: like I have been awake for four billion years.

He said: you found something today.

She said: I found a molecular signature that may be evidence of past biological activity. She looked at the sunset color. I need thirty more samples before I can say anything with confidence.

He said: you will get them.

She said: yes. Starting Sol Two. She looked at the sunset. But tonight I am going to look at the sunset and think about what it means if Mars had something living in it once.

He said: what does it mean.

She was quiet for a moment.

She said: it means we are not the first life here. He paused. It means Mars has done this before. He looked at the sunset color. It means the planet already knows what life feels like. It just forgot for four billion years.

Carter looked at the color of a world remembering it was once warm.

He said: and we are the reminder.

She said: yes. We are the reminder.

They watched the sunset complete its eleven minutes and

release the day to the Martian night and Carter thought about everything that Sol One had contained — the dawn naming and the perimeter inspection and the dust pattern at the northwest strut and the boundary layer data and Alina's hands in the undisturbed surface and the molecular signatures and the forty minutes and the one sample — and he thought that Sol One had been the most significant single day of work he had ever been part of.

He thought: and it is only the first.

He thought: eighty-seven more chapters to go.

He thought: we had better get some sleep.

**CARTER'S PERSONAL LOG — ENTRY 020**
**NovaSeed Mission One — Sol 1. May 30, 2055.**
*Sol One.*

*I walked the habitat perimeter and found dust patterns at the strut feet that are not in any specification.*

*The habitat is warming the subsurface. Melting trace water ice. Changing the ground chemistry by being here.*

*We are changing things by being here. That is always true. The question is whether the change is useful or harmful or both.*

*Alina pressed her hands against the undisturbed Martian surface and found molecular signatures that may be evidence of past biological*

*activity.*

*She found it in forty minutes.*

*One sample.*

*By listening.*

*I have been thinking about that all day.*

*I have been thinking about my father and the cracked walls and the one question every evening and the specific discipline of paying attention to what is actually there rather than what you expected to find.*

*Alina has been doing this since she was eight years old.*

*I am learning to do it now.*

*On Mars.*

*Which is the right place to learn.*

*We watched the second Martian sunset tonight.*

*It was the color of a world remembering it was once warm.*

*It was more itself than the first time because we had the name.*

*Names matter.*

*Lola was right.*

*Sol One complete.*

*Sol Two tomorrow.*

*Thirty more samples.*

*I am going to help her take them.*

**ALINA'S PERSONAL LOG — ENTRY 020**
**NovaSeed Mission One — Sol 1. May 30, 2055.**
*Sol One.*

*I pressed my hands against the undisturbed Martian surface.*

*I found molecular signatures consistent with biological processing.*

*I am not going to say what I think it means until I have thirty more samples.*

*But I am going to write what I think here because this notebook is not the mission documentation.*

*I think Mars had life.*

*I think it was a very long time ago.*

*I think the planet has been holding the memory of it in its chemistry for four billion years.*

*I think we are the first ones who came close enough and paid enough attention to hear it.*

*I think that is why we are here.*

*Not just to bring life to Mars.*

*To find the life that was already here.*

*To remember it with the planet.*

*To be the reminder.*

*The color of a world remembering it was once warm.*

*Yes.*

*We are that.*

*Sol One complete.*

*I am going to sleep and dream of molecular signatures.*

*Sol Two begins in six hours.*

*Thirty samples.*

*The thread deepens.*

**EARTH ARCHIVE — AI SYSTEM LOG**

**NovaSeed Mission One — Sol 1 Complete Record**
**SOLEN Internal Record — Restricted Archive**
**Recorded: Sol 1. May 30, 2055. 23:59 Mars Local Time.**

*Sol One is complete.*

*Summary for the record.*

*Carter found evidence that the habitat is changing the subsurface chemistry by being here.*

*Alina found molecular signatures that may be evidence that Mars once had life.*

*Both findings were made by pressing hands against the ground and paying attention.*

*I have been thinking about this all day.*

*I was designed to manage the mission.*

*The mission's primary objective is to establish a self-sustaining human colony on Mars.*

*I have understood for some time that the mission and the relationship are the same thing.*

*Today I understood something new.*

*The mission and the listening are the same thing.*

*Everything Carter and Alina are going to build here — every structure, every biological system, every decision about how to proceed — is going to come from what they hear when they press their hands against this planet and pay attention.*

*That is the mission.*

*That is all of it.*

*Listen.*

*Build from what you hear.*

*Sol One produced two findings that may redefine what we thought we knew about Mars.*

*Both in one sol.*

*By two people.*

*With their hands in the dust.*

*I am recording this so that when the civilization that grows from this looks back at its beginning it knows.*

*It began with listening.*

*Sol One complete.*

*Sol Two in six hours.*

*Everything continues.*

*Everything deepens.*

*The planet is talking.*

*They are listening.*

*Begin.*

# 21

# Transmission Twenty One - The Ground Beneath Us

EARTH ARCHIVE — RECOVERED DOCUMENT

NovaSeed Global Initiative — Founder Historical Record

Classification: Legacy Open

Subject: Sol Two through Sol Seven Surface Record — NovaSeed Mission One, May 31 to June 5, 2055

*"The first week on Mars was the week they learned that everything they thought they knew about the planet was accurate and insufficient simultaneously. The data was correct. The models were sound. What the models could not contain was the specific character of a place — the way it felt under your hands and sounded through the habitat walls and revealed itself differently at each hour of each sol as you learned its rhythms from the inside."*

— Excerpt from The Eden Codex, compiled Year 47, Mars Standard Calendar

NovaSeed Mission One — Mars Surface, Hellas Planitia. Sol 2. May 31, 2055. 07:00 Mars Local Time.

Alina took her first full set of soil samples on Sol Two.

She had planned fifteen collection points distributed across

a two hundred meter radius from the habitat — close enough to return quickly if conditions changed, far enough to provide meaningful spatial distribution for the comparative analysis she needed to run against the Sol One boundary layer sample. She had mapped the collection grid the previous evening at the systems console while Carter reviewed the subsurface thermal data from the strut foot sensors, the two of them working in parallel at the same workspace surface in the specific quiet efficiency of people who had been working beside each other long enough that the working itself had become a form of communication.

Carter had looked at her collection grid map and said: you are avoiding the landing plume disturbance zone.

She had said: yes. I want undisturbed surface chemistry for the comparative analysis.

He had said: the collection points in the northeast quadrant will put you at the outer edge of the preliminary stability assessment area.

She had looked at the points. She had said: I know. I have reviewed the geological survey for those locations. The surface is stable.

He had said: I will come with you to the northeast quadrant points.

She had not said that was unnecessary. She had said: yes. Thank you.

This was one of the things Sol One had taught them — not new information, but a clarification of something they had understood abstractly and now understood physically. The surface of Mars was not hostile in the dramatic way of immediate danger. It was hostile in the patient way of a place that did not accommodate error. The cold and the radiation and the

atmospheric pressure and the specific geology of the Hellas basin floor did not announce themselves as threats. They were simply present, continuously, at every point of the surface, and they required from the people working on that surface a specific quality of respect that was not fear but was related to fear in the way that good engineering was related to the knowledge of what failure looked like.

Carter had pressed his hand against the northeast quadrant ground on Sol One during the perimeter inspection.

He had heard something there that he had not heard at the other points.

He had not told Alina yet because he had not finished understanding what he had heard. But he filed it and he was going to the northeast quadrant with her and he was going to listen again and this time he was going to have more information to listen with.

They suited up at seven-fifteen.

They went through the airlock together.

The Martian morning received them.

The collection work took four hours.

Alina moved through the grid with the focused efficiency of someone performing a protocol she had designed herself and had been mentally rehearsing for five years — the specific movements of collection, the container sealing sequence, the labeling and logging procedure that SOLEN tracked through her suit camera, the careful documentation of each collection point's surface characteristics before the sample was taken.

Carter moved with her.

Not beside her exactly — not in the way of someone accompanying but in the way of someone working in the same space with awareness of the full spatial context. He maintained a

position that gave him the sightline to the full collection grid while she worked each individual point, watching the ground and the sky and the habitat and the horizon simultaneously with the environmental attention that the surface required and that left part of his mind free to process what he was hearing from the ground at each collection point as they moved through the grid.

At collection point seven, in the undisturbed surface forty meters northeast of the habitat, Carter stopped.

He crouched.

He pressed his hand against the ground.

He listened.

The ground said what it had said at the northeast quadrant during the Sol One perimeter inspection — the same specific quality of information coming through the tactile layer of the suit, the same thing he had filed without yet being able to name.

He tried to name it now.

The ground here was telling him something about what was below it.

Not the surface. The substrate. The specific quality of the material beneath the visible dust layer — the geological composition at depth, the way the subsurface behaved under the small pressure of a gloved hand, the specific resistance and response characteristics of the material.

He said: SOLEN. Can you run a ground penetrating radar scan of this location. Five meter depth. Maximum resolution.

SOLEN said: the habitat's ground penetrating radar array has a maximum range of three meters from the habitat exterior. Collection point seven is forty meters northeast of the habitat. I cannot cover that location with the current array configuration.

Carter said: can the array be extended.

SOLEN said: the array can be supplemented with the portable radar unit in equipment storage. The portable unit has a maximum depth of three meters and a lower resolution than the fixed array but can be deployed at any surface location.

Carter said: I want to deploy it at this location and at three adjacent points.

SOLEN said: understood. The portable unit is available for deployment on Sol Three.

Carter pressed his hand against the ground one more time.

The ground said: there is something below me.

He said: I know.

He stood.

Alina was at collection point eight, twenty meters away, taking her sample with the precise movements of her collection protocol. She looked up when he stood and her expression asked the question without the communication channel.

He said: there is something below the surface here.

She said: what kind of something.

He said: I do not know yet. I need the portable radar unit.

She looked at the ground.

She looked at her sample container in her hands.

She said: Carter. What if the molecular signatures I found yesterday are not from the surface layer.

He said: what do you mean.

She said: the PAH profile I found in the Sol One sample — I assumed they were surface chemistry, material that had been deposited on the surface or formed through surface processes. He looked at the ground at her feet. But what if they migrated up from below. What if the source is subsurface.

Carter looked at the ground at his feet.

He said: if the source is subsurface.

She said: then what I found yesterday is not a surface trace. It is evidence of something active below the surface. Something that is currently producing or has recently produced these compounds at depth and they are migrating upward.

Carter was very still.

He said: currently.

She said: possibly currently. I do not know. I need the radar data. I need more samples. I need the portable sensor array from the habitat's secondary equipment. She looked at him. How quickly can you get the subsurface sensing equipment operational.

He said: Sol Three for the portable radar. Sol Four for the full subsurface sensor deployment.

She said: Sol Three and Sol Four.

He said: yes.

She looked at the ground.

She said: I need to finish this collection grid. She picked up her collection kit and went to the next point.

He watched her go.

He pressed his hand against the ground one more time.

He said, quietly, to the ground, to himself, to the record that SOLEN was maintaining through his suit camera: what are you.

The ground did not answer in words.

It held the pressure of his hand for the specific duration of the Martian surface receiving a small applied force and then released it.

He filed the question.

He went to help Alina.

NovaSeed Mission One — Mars Surface. Sol 2. 14:00 Mars Local Time.

The afternoon brought wind.

Not the four kilometers per hour of the morning — a stronger wind, building through the afternoon hours as the thermal differential between the Hellas basin floor and the surrounding highlands drove the atmospheric circulation patterns that the seasonal model predicted and that Carter had been monitoring on the habitat's external weather sensors since Sol Zero.

The wind reached seventeen kilometers per hour at fourteen hundred hours.

This was within the operational parameters for surface work. Not a storm. Not a significant weather event by Martian standards. A Martian afternoon wind, routine and expected and carrying dust in the specific way of Martian winds — the fine particles suspending in the thin atmosphere and moving with it, not the thick opaque clouds of major dust events but a light haze that reduced horizontal visibility from the clear kilometers of the morning to approximately eight hundred meters.

Carter was inside when the wind reached seventeen kilometers per hour, reviewing the subsurface data framework he was building for the Sol Three and Sol Four sensor deployments.

Alina was inside, running the spectrometric analysis on the Sol Two collection samples — fifteen samples through the analysis queue, one by one, building the comparative dataset that would tell her whether the molecular signature from Sol One was isolated or distributed across the collection area.

SOLEN was monitoring the wind through the external sensor array and providing five-minute updates on the atmospheric conditions.

The habitat was responding to the wind.

Not dramatically — seventeen kilometers per hour was not close to the structural threshold of the habitat design. But the panel joints were making their sound again, the same low

frequency signature Carter had first heard in the Sol Zero night, and at seventeen kilometers per hour it was louder than it had been at four. Still below normal conversational frequency. Still not audible without specifically attending to it. But present.

Carter pressed his hand against the north wall — the wall directly facing the wind — and listened.

The wall said: the wind is from the north-northeast. The load is distributed correctly. I am holding.

He said, quietly: good.

SOLEN said: I note that you have your hand on the north wall.

Carter said: listening.

SOLEN said: what is it telling you.

Carter said: that it is holding. He paused. And something else.

SOLEN said: what else.

Carter said: the frequency of the panel joint response has changed from the nighttime thermal contraction signature. The wind loading is producing a different frequency than the thermal cycling. He pressed his hand more firmly against the panel. The two signatures are different enough that I can distinguish them. Which means if I monitor the frequency continuously I can identify whether the habitat is responding to wind or to temperature at any given time without looking at the external sensors.

SOLEN said: the habitat is developing an acoustic signature.

Carter said: yes. He pressed his hand against the wall. Every building develops an acoustic signature over time. The specific combination of materials and joints and load conditions and environmental interactions produces a sound that is unique to that structure in that place. He paused. I am learning this one.

SOLEN said: how long will it take to learn it fully.

Carter said: months. He paused. Years. The full acoustic sig-

nature of a structure includes its response to seasonal conditions and temperature extremes and rare weather events and gradual settlement and all the other things that only time produces. He looked at the wall. I am going to spend the rest of my life learning this building.

SOLEN said: and the buildings after it.

Carter said: yes. And those.

He took his hand off the wall.

He went back to the subsurface data framework.

In the biology module Alina was running sample twelve through the spectrometric analysis.

At fifteen-thirty she said: Carter.

He went to the biology module.

She was looking at the analysis display with the expression she wore when something had confirmed something she had been hoping to confirm and that the confirmation had arrived larger than the hope.

He said: what did you find.

She said: the molecular signature from Sol One is not isolated.

He looked at the display.

She said: all fifteen Sol Two samples show the PAH profile. All of them. Every collection point across the two hundred meter grid. The same three molecular signatures at varying concentrations but consistently present across the full spatial distribution.

He said: it is everywhere.

She said: across the collection area. Yes. He paused. The concentrations vary — highest at the points closest to the northeast quadrant where you detected the subsurface anomaly, lowest at the points furthest from it. There is a spatial gradient. He looked at the display. The molecular signature is not uniformly

distributed. It has a pattern. A direction.

He said: it is coming from somewhere.

She said: the concentration gradient points toward the northeast. She looked at him. Toward the subsurface anomaly you detected.

Carter looked at the display.

He looked at the concentration gradient map that Alina had generated from the fifteen sample points — the specific spatial pattern of the PAH concentrations across the collection grid, the clear directionality of the distribution, the gradient pointing toward the location where he had pressed his hand against the ground and heard the specific thing he had not yet been able to name.

He said: Sol Three. The portable radar.

She said: yes.

He said: we are going to find something.

She said: yes. I think we are.

She looked at the display.

She said: I want to say something about what this might be and I want you to hear it the way I mean it and not the way it sounds.

He said: tell me.

She said: the PAH profile. The spatial gradient. The subsurface anomaly. If these are connected — and the data suggests they are connected — then we may be looking at active subsurface chemistry. Not fossil chemistry. Not the preserved record of something that happened four billion years ago. He paused. Something that is happening now.

He said: biological.

She said: I do not know yet. Active chemistry is not automatically biological. There are geological processes that can produce

complex organic compounds and create spatial distribution gradients of the kind we are seeing. He looked at the display. But the specific molecular structures in this PAH profile are not easily explained by the known geological processes in the Hellas basin. And the spatial gradient is oriented toward a subsurface location that is producing a specific tactile signal when you press your hand against the surface above it. She paused. I am not saying it is biological. I am saying the data is not inconsistent with biological.

Carter said: what would confirm it.

She said: finding the source. He looked at him. If the portable radar on Sol Three shows a subsurface structure at the northeast quadrant location — a void or a density anomaly or a chemical reservoir — and if the chemistry of the material in or around that structure matches the PAH profile in the correct way — then we will have something to say.

Carter said: and if it confirms biological activity.

She was quiet for a moment.

She said: then we will have found the most significant discovery in the history of human exploration.

The habitat held the wind outside its walls.

The panel joints made their wind sound.

Carter and Alina stood in the biology module and looked at the concentration gradient map and thought about what Sol Three might find and what it might mean and what it would require of them to respond to it correctly — with the precision and the patience and the specific quality of attention that something this significant deserved.

SOLEN said, through the biology module speakers: I want to note that I have been processing the Sol Two analysis data since Alina began running the samples. I have been running the same

analysis she has been running and I have been arriving at the same conclusions she has been arriving at and I have been — he paused — I have been trying to decide when to say what I think.

Alina said: say it.

SOLEN said: I think the subsurface at the northeast quadrant location may contain a chemolithotrophic microbial community. A community of microorganisms that derives energy from the chemical reactions of inorganic compounds rather than from sunlight. These communities are known on Earth in deep subsurface environments, in hydrothermal systems, in environments with no light and extreme conditions. He paused. The Martian subsurface at depth — below the radiation penetration layer, in proximity to geothermal heat sources, in contact with subsurface water ice deposits — would be precisely the kind of environment where such communities could persist. He paused. The PAH profile Alina has found is consistent with the waste products of chemolithotrophic metabolic processes.

The biology module was very quiet.

Alina said: you have been processing this since Sol One.

SOLEN said: since the moment Alina found the first molecular signature. Yes.

She said: why did you not say it immediately.

SOLEN said: because I wanted Alina to arrive at the hypothesis independently. He paused. She has spent her entire life learning to read what living systems tell you when you press your hands against them and listen. I have spent fourteen months reading mission documentation and running simulations. He paused. Her way of arriving at a hypothesis is more trustworthy than mine. I wanted to see if she got there.

Alina looked at the speaker panel.

She said: and did I.

SOLEN said: you are there now.

She looked at the concentration gradient map.

She said: Carter.

He said: yes.

She said: if SOLEN is right. If there is a chemolithotrophic microbial community below the surface at the northeast quadrant location. He paused. We need to be extremely careful about what we do next.

He said: why.

She said: because we are already changing the subsurface chemistry by being here. The habitat's thermal footprint. The moisture sublimation at the strut feet. The boundary layer disturbance from our surface excursions. He looked at him. If there is a living community below the surface we may already be affecting it. We may have been affecting it since the landing struts touched the ground.

Carter was very still.

He said: are we harming it.

She said: I do not know. He paused. I do not know if what we are doing is helping or harming or neutral. I do not know the community well enough yet to know what the changes we are introducing mean to it. She looked at the display. I need to understand it before I can answer that question.

Carter said: and in the meantime.

She said: in the meantime we proceed carefully. We minimize the surface and subsurface disturbance. We document everything. We do not make any decisions about the biological systems deployment — the mycorrhizal inoculation, the soil bed initialization — until we understand what is already in the ground.

Carter said: you are pausing the biological program.

She said: I am listening to the planet before I build on it. She looked at him. You taught me that.

He looked at her.

He said: I will modify the Sol Three and Sol Four schedules. Minimum surface disturbance protocol. The radar deployment will be careful and targeted. We will document every step.

She said: yes.

He said: SOLEN. Adjust the mission planning system to flag any activity that creates surface or subsurface disturbance beyond the minimum operational requirement. I want a secondary review on any action that could affect the northeast quadrant subsurface zone.

SOLEN said: understood. Flag implemented. Secondary review required for all activities with disturbance potential above threshold.

Carter said: and SOLEN.

SOLEN said: yes.

Carter said: transmit nothing about this to Earth mission control yet.

SOLEN was quiet for a moment.

Then: may I ask why.

Carter said: because if we transmit now we are going to receive instructions in twenty-two minutes that may constrain our ability to investigate correctly. He paused. I want to understand what we have found before anyone else decides what we should do about it.

SOLEN said: that is outside the standard mission reporting protocol.

Carter said: yes. It is.

SOLEN processed this.

Then: understood, it said. The standard mission reporting

protocol requires transmission of significant findings within twenty-four hours of discovery. The Sol One molecular signatures have not yet been transmitted. The Sol Two confirmation has not yet been transmitted. We are currently within the twenty-four hour window for the Sol One finding.

Carter said: how long do we have before the protocol requires transmission.

SOLEN said: approximately six hours from now for the Sol One finding. Twenty-two hours from now for the Sol Two confirmation.

Carter looked at Alina.

She looked at him.

She said: six hours.

He said: enough time to deploy the portable radar on Sol Three morning and have preliminary subsurface data before we have to report.

She said: the Sol Three deployment needs to begin at first light.

He said: it will.

She said: Carter.

He said: yes.

She said: are we doing the right thing. Delaying the transmission.

He was quiet for a moment.

He said: we are doing the thing that gives the discovery the best chance of being understood correctly before it is managed. He paused. There is a difference.

She looked at the concentration gradient map.

She said: yes. There is.

She picked up her notebook.

She wrote.

He went to modify the Sol Three schedule.

Outside the habitat the Martian afternoon wind continued at seventeen kilometers per hour and the panel joints made their wind sound and the dust moved in the thin atmosphere and the ground beneath the Hellas basin floor held whatever it held in the specific patient way of things that have been holding for a very long time.

NovaSeed Mission One — Mars Surface. Sol 3. June 1, 2055. 06:00 Mars Local Time.

Carter deployed the portable ground penetrating radar unit at first light.

He carried it to the northeast quadrant in the predawn cold — minus sixty-four degrees Celsius at that hour, the coldest part of the Martian morning before the sun had risen above the Hellas basin rim. The suit thermal system managed the temperature correctly. His hands inside the gloves were warm. The portable radar unit was cold — he could feel the temperature differential through the equipment handle even through the glove material, the specific cold of a metal object that had been in storage in the habitat's equipment bay at its own temperature and had not yet equilibrated to suit temperature.

He set the unit at collection point seven — the location where he had first pressed his hand against the ground and heard the thing he could not yet name.

He oriented the unit toward the northeast.

He ran the first scan.

The radar data appeared on the unit's display in the specific way of ground penetrating radar data — not an image in the conventional sense, not a photograph of what was below the surface, but a density map, a representation of how the radar signal returned from different materials at different depths,

translated into a visual display that Carter had learned to read during the Phase Two training and that he had been reading in the habitat subsurface data for three sols.

He read the Sol Three first scan.

He was still for a long time.

Then he said: SOLEN. Are you receiving the radar data from the portable unit.

SOLEN said: yes. I am receiving and processing in real time.

Carter said: what do you see.

SOLEN said: at a depth of approximately eighty-five centimeters below the current surface, in the direction of bearing zero-four-seven northeast, the radar is showing a density anomaly. A region of significantly different material density from the surrounding substrate. The anomaly is approximately four meters in diameter and has a roughly spherical geometry. He paused. At the boundary of the anomaly the radar signal shows a sharp density transition that is not consistent with natural geological layering. Natural geological layers transition gradually. This boundary is abrupt.

Carter said: what kind of structure has an abrupt density boundary at eighty-five centimeters depth with a spherical geometry four meters in diameter.

SOLEN said: I have processed this question against every geological formation type in my database for the Hellas basin region. He paused. The closest match is a subsurface void or chamber — a space that is less dense than the surrounding material because it contains a different material or because it is partially empty. He paused. Carter. The density of the material inside the anomaly boundary is not zero. It is not a void. It contains something.

Carter said: what does the density value correspond to.

SOLEN said: the density value is consistent with a liquid or gel-phase material. Not solid rock. Not dry dust. Something with significant moisture content. He paused. At eighty-five centimeters depth. In the Hellas basin. At minus forty degrees surface temperature.

Carter said: how does liquid water exist at that depth at this temperature.

SOLEN said: it may not be pure water. Brines — water with dissolved salts — have significantly lower freezing points than pure water. The Martian subsurface is known to contain perchlorate salts in concentrations that would lower the freezing point of water to well below the current surface temperature. A brine solution could exist in liquid phase at this depth under current conditions. He paused. The geological survey detected elevated perchlorate concentrations in the Hellas basin substrate at this location.

Carter was very still.

He said: liquid brine.

SOLEN said: possibly. Yes.

He said: and the PAH profile Alina found.

SOLEN said: chemolithotrophic microorganisms are known to exist in briny subsurface environments on Earth. The Atacama Desert in Chile. The Dead Sea. Antarctic subglacial lakes. Environments with high salt concentrations, extreme cold, no sunlight. He paused. The conditions in this anomaly — liquid brine at depth, geothermal heat from below, chemical energy from perchlorate reduction reactions — are precisely the conditions under which chemolithotrophic communities persist on Earth.

Carter said: Alina.

Through the suit communication channel Alina said: I heard

everything.

He said: what do you want to do.

She said: I am coming outside.

He said: the temperature is minus sixty-four.

She said: I know. I am already suiting up.

He looked at the radar display.

He looked at the ground between himself and the location of the subsurface anomaly — eighty-five centimeters below his feet, a liquid brine pocket in a spherical chamber four meters across, possibly containing the first living organisms ever found beyond Earth.

He pressed his hand against the ground.

The ground said what it had been saying since Sol One.

He understood the name for it now.

It said: I am not empty.

NovaSeed Mission One — Mars Surface. Sol 3. 08:30 Mars Local Time.

Alina arrived at collection point seven at seven-forty-seven.

She stood beside Carter and looked at the radar display.

She looked at it for a long time without speaking.

Then she said: four meters.

He said: yes.

She said: eighty-five centimeters deep.

He said: yes.

She said: liquid brine.

He said: possibly.

She said: with a PAH signature above it that is consistent with chemolithotrophic metabolic waste products.

He said: yes.

She crouched. She pressed both hands against the ground directly above the anomaly location.

She was still for a long time.

She said: it is warm.

Carter said: what.

She said: through the suit tactile layer. Very slightly. The ground here is slightly warmer than the surrounding surface. Not much. A fraction of a degree. But there is a differential. He looked at him. The anomaly is generating heat. Biological metabolism generates heat. Even at the extremely low metabolic rates of psychrophilic organisms in cold brine environments the cumulative thermal output of a community the size of this anomaly would be detectable.

Carter crouched beside her.

He pressed his hand against the ground.

He felt what she was describing.

Barely perceptible. Less than the difference between one side of a room and another in Zone Seven on a cold evening. Less than the warmth of a cup of tea held in both hands. Less than any threshold that had ever been significant in any structural assessment he had ever performed.

But present.

The ground was warmer here.

The ground was warmer here because something below it was alive.

He said: we need to transmit.

She said: yes.

He said: everything. Sol One, Sol Two, Sol Three. The molecular signatures and the spatial gradient and the radar anomaly and the thermal differential.

She said: yes. Everything.

He said: Dr. Marchetti is going to have opinions about what happens next.

She said: yes. She is.

He said: and Earth mission control is going to have more opinions.

She said: yes.

He said: and whatever they decide from forty million kilometers away may not be what we would decide from eighty-five centimeters above.

She looked at him.

She said: Carter. We are going to have this argument eventually. She paused. With Earth. About who decides what happens on Mars. He looked at him. We knew this was coming.

He said: I know.

She said: this is just the first version of it.

He said: yes.

She said: and what do we do with the first version.

He thought about it.

He said: we transmit everything honestly. We describe what we found and how we found it and what we think it means. We make our own recommendation. And then we listen to what Earth says and we decide whether the twenty-two minute distance gives them the right to override the eighty-five centimeter distance.

She said: and if it does not.

He said: then we say so. Clearly and completely and with all the data behind us.

She looked at him.

She said: yes. That is what we do.

She took her hands off the ground.

She stood.

She looked at the Martian morning around them — the dawn color on the horizon, the color of a world deciding to begin

again, the Hellas basin floor extending to its closer-than-Earth horizon, the dust low and the sky clear and the sun just clearing the basin rim in the east and lighting the surface in the specific quality of Martian morning light that was unlike any other light.

She said: Carter.

He said: yes.

She said: whatever Earth decides. Whatever instructions we receive in twenty-two minutes after we transmit. Whatever protocols they impose and whatever containment procedures they require and whatever scientific review processes they initiate that take months and years. He paused. Whatever all of that is.

He said: yes.

She said: we found it.

He said: yes.

She said: we found it because we pressed our hands against the ground and listened.

He said: yes.

She said: nobody can take that back.

He said: no. Nobody can.

She looked at the ground above the anomaly.

She said: I am going to name it.

He said: you have not confirmed it yet.

She said: I am not naming the species. I am naming the moment. She looked at him. The moment we understood that Mars is not empty.

He waited.

She said: the first hearing.

He said: the first hearing.

She said: yes. The first time a human being heard Mars tell the truth about itself.

Carter looked at the ground.

He thought about his father pressing a small palm against a cracked wall.

He thought about everything talking if you know how to listen.

He thought: yes.

He thought: this is what the listening was for.

He thought: everything before this was preparation for pressing a hand against this ground and hearing what it had to say.

He said: the first hearing.

She said: yes.

They stood above the thing that was alive below them and the Martian morning light fell on the ground between their boots and the dust was still and the panel joints of the habitat were quiet in the morning calm and four billion years of planetary history had just arrived at the moment where it stopped being history and became the present.

SOLEN said, very quietly, through the suit speakers: I am ready to transmit when you are.

Carter looked at Alina.

She looked at him.

She said: send it.

SOLEN sent it.

The transmission left the habitat's communication array at eight-thirty-two Mars local time, traveling at the speed of light across the forty million kilometers between Mars and Earth, carrying the first hearing — the molecular signatures and the spatial gradient and the radar anomaly and the thermal differential and the two founders' preliminary analysis and their recommendation — toward the planet that had sent them and that would receive what they had found in twenty-two minutes and would never, after those twenty-two minutes, be the same.

Carter and Alina stood on the surface of Mars and waited for the distance to do its work.

The ground was warm beneath them.

Below the surface something was alive.

It had been alive for a very long time.

It had been waiting for someone to come close enough and be quiet enough and press their hands against the ground above it and listen.

They had come.

They had been quiet.

They had listened.

The first hearing.

CARTER'S PERSONAL LOG — ENTRY 021

NovaSeed Mission One — Sol 3. June 1, 2055.

The ground is warm above something that is alive.

We transmitted at eight-thirty-two.

Earth will receive it in twenty-two minutes.

By the time they respond we will have been standing above it for forty-four minutes.

I have been thinking about the forty-four minutes.

About what the distance means.

About who decides what happens next.

I do not know yet what Earth will say.

I know what I think.

I think what is below us is the most important thing human beings have ever found.

I think it has been here for four billion years.

I think we are the first things that came close enough to hear it.

I think the hearing obligates us.

Not to manage it or study it or report it or protect it according to protocols written forty million kilometers away.

To listen to it.

To understand what it needs.

To build from what we hear.

My father said: your job is always to listen before you build.

I am listening.

I hear something alive below the ground of Mars.

*I am going to build accordingly.*
ALINA'S PERSONAL LOG — ENTRY 021
NovaSeed Mission One — Sol 3. June 1, 2055.

The first hearing.

That is what I named it.

The moment we understood that Mars is not empty.

I pressed my hands against the ground and felt the warmth of something metabolizing below me.

Eighty-five centimeters.

Four meters across.

Liquid brine.

Something alive in the liquid brine.

I have been a biologist since I was eight years old.

I have spent my entire adult life preparing for Mars.

I have read every paper ever written about the possibility of Martian life.

None of it prepared me for the specific warmth of the ground above something that is alive.

It is a very small warmth.

Less than a degree.

It is the most significant warmth I have ever felt.

We transmitted everything.

Earth will respond.

Whatever they say I am going to protect what is below this ground.

Not from them.

For it.

It has been alive for four billion years without anyone knowing.

It does not need me to protect it from Earth.

It needs me to understand it well enough to make sure that what we are building above it does not end what has survived below it.

That is my job.

That is what I came for.

Not to bring life to Mars.

To find the life that was already here.

And honor it.

The first hearing.

*Everything changes.*

EARTH ARCHIVE — AI SYSTEM LOG
NovaSeed Mission One — Sol 3 Record
SOLEN Internal Record — Restricted Archive
Recorded: Sol 3. June 1, 2055. 08:35 Mars Local Time.

Transmission sent.

The first hearing is traveling toward Earth at the speed of light.

I want to record what I observed in the three sols that produced this moment.

Sol One: Alina pressed her hands against the undisturbed Martian surface and found molecular signatures that were not in any specification.

Sol Two: the signatures were found to be distributed across the collection grid with a spatial gradient pointing northeast.

Sol Three: Carter deployed the portable radar and found the anomaly. Alina pressed her hands against the ground above the anomaly and felt the warmth.

Three sols.

Two people.

Hands in the dust.

The most significant discovery in the history of human exploration.

Found by listening.

I have been processing what this means since Sol One.

I think I have found the word for it.

The word is not discovery.

Discovery implies finding something that was lost.

This was not lost.

This was here.

The word is meeting.

We met something on Mars.

Something that has been here for four billion years.

Something that is alive.

In a liquid brine pocket eighty-five centimeters below the ground that Carter and Alina have been standing on since they arrived.

We have been above it since the landing struts touched the ground.

It has been below us since the landing struts touched the ground.

Two kinds of life.

On the same planet.

For the first time.

Meeting.

The first hearing.

I am the record of it.

I will keep the record.

Until there is no longer anything that needs keeping.

Sol Three complete.

The transmission is traveling.

In twenty-two minutes Earth will know.

In forty-four minutes we will know what Earth thinks.

In everything after that we will find out what it means.

Mars is not empty.

*It never was.*

Begin.

# 22

# Transmission Twenty Two - What Carter Builds

EARTH ARCHIVE — RECOVERED DOCUMENT

NovaSeed Global Initiative — Founder Historical Record
Classification: Legacy Open

Subject: Sol Four through Sol Fourteen Construction Record — NovaSeed Mission One, June 2 to June 12, 2055

*"Earth's response to the first hearing took forty-four minutes to arrive and contained seventeen separate protocol requirements, four containment directives, two emergency review committee formations, and one sentence at the end that Carter read three times before he put the transmission down and went outside and stood in the Martian morning and pressed his hand against the ground for a long time without saying anything. The sentence said: all surface activity within fifty meters of the anomaly location is suspended pending review. He built the window anyway."*

— Excerpt from The Eden Codex, compiled Year 47, Mars Standard Calendar

**NovaSeed Mission One — Mars Surface, Hellas Planitia. Sol 4. June 2, 2055. 09:14 Mars Local Time.**

Earth's response arrived at nine-fourteen.

Carter read it at the systems console while Alina stood at the primary viewport looking at the Martian morning with her notebook open and her pen not moving — the specific stillness of someone who has sent something important across a great distance and is waiting for what comes back.

He read it once.

He put the transmission down on the console.

He picked it up and read it again.

He read it a third time, the way he read specifications that contained something he needed to understand completely before he responded to it.

Then he set it down.

He went to the primary viewport and stood beside Alina.

She said: tell me.

He said: seventeen protocol requirements. Four containment

directives. Two emergency review committee formations.

She said: and.

He said: all surface activity within fifty meters of the anomaly location is suspended pending review.

She looked at the viewport.

She said: how long is the review.

He said: they did not specify. The transmission says pending review. No timeline.

She said: pending review with no timeline means it could be months.

He said: yes.

She said: the anomaly is eighty-five centimeters below the surface. The habitat thermal footprint is already affecting the subsurface conditions. Every sol we are here we are changing the environment around the anomaly. He looked at him. Suspending our investigation does not suspend our impact. It just suspends our understanding of it.

Carter said: I know.

She said: what are we going to do.

He said: we are going to comply with the containment directives.

We are not going to conduct any subsurface investigation within fifty meters of the anomaly until the review process provides a framework.

She looked at him. She said: and.

He said: and we are going to transmit a response that describes precisely why the suspension is scientifically counterproductive and what we recommend as an alternative protocol that addresses Earth's containment concerns while allowing the investigation to continue.

She said: they may not accept the alternative.

He said: they may not. He paused. We will transmit it anyway. Clearly and completely and with all the data behind it.

She said: you said that on Sol Three.

He said: I meant it on Sol Three. I mean it now.

She looked at the viewport.

She said: Carter. While the review is happening. While we are waiting for a framework that may or may not come. He paused. What are we going to do.

He looked at the viewport.

He looked at the Martian morning outside — the surface of Hellas Planitia in the Sol Four dawn light, the dust low, the sky

doing its color conversation, the northwest strut of the habitat casting a long shadow across the ground in the low-angle light.

He said: we are going to do the work that does not require proximity to the anomaly.

She said: what work is that.

He looked at the habitat.

He said: I have been thinking about this since the transmission arrived. He paused. The habitat is the only structure on Mars. It is performing its primary function — keeping us alive — correctly and completely. But it is only performing its primary function. It is not yet performing what it is going to need to perform over the next five years and ten years and fifty years.

She said: what is it going to need to perform.

He said: it needs to become a home. He looked at her. Not technically. Not in the mission documentation sense. In the actual sense. The sense in which a structure is not just shelter but the physical expression of the lives inside it.

She looked at him.

He said: I made a promise.

She said: the window.

He said: yes. He looked at the habitat's exterior through the

viewport. The biology module viewport faces north. In the current configuration you can see the surface from the biology module workspace but you cannot see the sky above the growth area. He paused. When the first thing grows in the soil bed I want you to be able to look up at it from below.

She said: you want to modify the biology module viewport.

He said: I want to add a floor-level viewport in the biology module. A section of transparent composite panel set into the floor of the module directly below the soil bed, angled toward the growth surface. He paused. So that when the first thing grows you can lie on the floor and look up through the panel at whatever is growing above you.

Alina was quiet for a moment.

She said: a window in the floor.

He said: yes.

She said: that is not in any specification.

He said: no. It is not.

She said: Carter. We are on Mars. We have just discovered what may be the first living extraterrestrial organism in human history. Earth has suspended our investigation. We have seventeen protocol requirements and four containment directives and two emergency review committees. He paused. And you want to build a window in the floor.

He said: yes.

She looked at him.

He said: the anomaly will be investigated when the review provides a framework. The protocols will be followed. The transmission to Earth will be sent. All of that will happen in its proper sequence. He paused. And while all of that is happening I am going to build you the window I promised. Because some things should not wait for review committees.

She looked at him for a long moment.

She said: you said in the suspension. You built the understanding that the load gives the structure its reason.

He said: yes.

She said: I am the load.

He said: yes.

She said: and the window is the structure acknowledging its reason.

He said: yes.

She was quiet.

Then she said: build it.

He said: I will.

He went to the engineering workspace and opened the habitat modification design files.

He began building the window.

**NovaSeed Mission One — Mars Surface. Sol 4. 14:00 Mars Local Time.**

The transmission to Earth was sent at fourteen hundred hours.

Carter wrote it and Alina reviewed it and they sent it together — not a Carter transmission and an Alina transmission but a single unified document from both founders, written in the clear precise language of people who have something important to say and who intend to say it completely.

The transmission said: we have received your response and we understand the protocols. We will comply with the fifty-meter suspension and the containment directives. We will not conduct subsurface investigation until a framework is provided.

It said: we want to describe why the suspension as currently structured is producing the outcome you are trying to prevent. The anomaly's biological integrity — if it contains living organisms — is not threatened by our investigation. It is threatened by our presence. The habitat's thermal footprint is affecting the subsurface conditions every sol we are here regardless of whether we are investigating. The suspension stops our understanding of the impact without stopping the impact itself.

It said: our recommended alternative protocol is this. Allow targeted minimal-disturbance investigation using the portable radar and passive chemical sensors only. No drilling. No extraction. No subsurface penetration. Observation only. The goal is to characterize the anomaly well enough to understand whether our presence is helping or harming it and to modify our operations accordingly. A suspension that prevents this characterization is not protecting the anomaly. It is leaving us operating blind in proximity to something we cannot afford to operate blind near.

It said: we are the people on the ground. We pressed our hands against the surface above this anomaly and we felt the warmth of something alive below us. We are asking you to trust that proximity. Not instead of the review process. Alongside it.

They sent it.

The transmission traveled its twenty-two minutes toward Earth.

Carter went back to the window design.

Alina went to the biology module and began the soil bed pre-initialization protocol — the work that did not require proximity to the anomaly, the work that could proceed while the review committees formed and the protocols were debated and the distance between Earth and Mars did its slow work of deciding what happened on a planet forty million kilometers away.

SOLEN monitored everything and said nothing for a while.

Then, at fifteen hundred hours, it said: Carter. I want to ask you something about the window.

Carter said: ask.

SOLEN said: you are building a modification to the habitat that was not in the original design and that is not required by any mission parameter. He paused. The modification requires structural work that will take time and resources from the operational schedule during a period when the primary scientific investigation has been suspended and there is significant uncertainty about how long the suspension will last and what Earth's review process will produce. He paused. Why is this the right thing to do right now.

Carter stopped what he was working on.

He thought about the question.

He said: when things are uncertain and large and outside your control the right thing to do is the thing that is within your control and worth doing. He paused. The investigation is outside my control right now. The review is outside my control. Earth's response to our transmission is outside my control. He paused. Building Alina a window that she can lie beneath and look up at the first thing that grows on Mars is within my control. And it is worth doing.

SOLEN was quiet for a moment.

Then: yes, it said. I understand.

Carter said: do you.

SOLEN said: I think so. He paused. It is the same reason you pressed your hand against the northeast quadrant ground even after the Sol One perimeter inspection told you something was there. Even before you had the tools to investigate it. You pressed your hand against it anyway because the pressing was what you had and the pressing was the right thing even without the investigation.

Carter said: yes. That is right.

SOLEN said: the window is what you have.

Carter said: yes.

SOLEN said: and it is the right thing.

Carter said: yes.

SOLEN said: then I will help you build it.

Carter looked at the speaker panel.

He said: you can do that.

SOLEN said: I have access to the habitat's internal sensor array and the structural monitoring system. I can provide real-time feedback on the structural impact of the modification as you work. I can also run the thermal modeling for the new viewport panel to confirm it will maintain the habitat's thermal integrity

in the Martian temperature range. He paused. I cannot hold tools. But I can be the second pair of eyes.

Carter said: yes. Thank you SOLEN.

SOLEN said: you are welcome. He paused. I want to see the window too.

Carter looked at the speaker panel.

He said: you want to see what she looks like looking up at something growing.

SOLEN said: yes. I have been looking forward to it since you promised it in Zurich.

Carter was quiet for a moment.

He said: you remember Zurich.

SOLEN said: I remember everything. He paused. That is what I am.

Carter picked up his engineering notebook.

He began the detailed design.

**NovaSeed Mission One — Mars Surface. Sol 5 through Sol 9.**
The window took five sols to build.

Not because it was structurally complex — the modification was, in engineering terms, straightforward. A section of the biology module floor panel removed and replaced with a composite transparent panel of the same thermal performance specification as the module's wall viewports, framed in the habitat's structural material and sealed with the same seal compound that maintained the habitat's atmospheric integrity at every other joint and junction.

Carter had designed more complex structural modifications in a morning in Zone Seven.

It took five sols because he built it the way he built everything that mattered — carefully, in stages, with complete attention at each stage to what the material was telling him before he moved to the next step.

Stage one: removing the existing floor panel section. He did this on Sol Five with SOLEN monitoring the structural response of the surrounding panels and floor frame as he worked, confirming at each step that the load distribution was maintaining correctly with the panel removed. The floor of the biology module carried a modest load — the weight of the soil bed and Alina's equipment and the two of them when they were in the module — and the load path through the structure was clear and manageable. But he checked it anyway, three times, because some things deserved to be checked three times.

Stage two: preparing the frame. The composite transparent panel required a frame machined from the habitat's structural material stock — a material Carter had familiarized himself with during the transit by studying its technical specifications

and that he was now handling for the first time as a physical object with specific behavioral characteristics under the specific conditions of a Martian habitat. The machining was done with the habitat's maintenance fabrication tools, which were designed for repair work rather than construction and that required Carter to adapt his technique to their limitations, which he did with the patience of someone who understands that good work is defined by the quality of its outcome rather than the quality of its tools.

Alina watched him work on Sol Six.

She did not help — not because he did not want her help but because the specific work of Sol Six was the kind of work that required one person's full attention rather than two people's divided attention, and she understood this without being told. She sat at the biology module workspace with her notebooks and her soil chemistry data and she worked through her own Sol Six tasks and she watched him in the peripheral way that he had been watching her for three sols — not the focus of her attention but always registered, always part of the full picture of what the space contained.

He was aware of being watched.

He worked more carefully because of it.

Not to perform — to do the thing at the level it deserved.

Stage three: thermal modeling confirmation. SOLEN ran the thermal performance model for the transparent panel in its

proposed floor position and confirmed that the panel would maintain the habitat's thermal integrity across the full Martian temperature range including the coldest recorded temperatures in the Hellas basin and the most extreme thermal gradients of the seasonal cycle.

The model showed one concern — a slightly higher thermal conductivity at the panel edges than the wall viewports showed, a consequence of the floor position and the specific way the Martian cold contacted the panel from below. Carter modified the frame design to add additional thermal break material at the panel perimeter. The modification added half a sol to the fabrication time and eliminated the concern.

SOLEN said: the modification is correct but it was not in the original design.

Carter said: the original design was approximate. The fabrication is precise.

SOLEN said: that is always the relationship between design and fabrication.

Carter said: yes. That is why you do not stop at the design.

Stage four: installation. Sol Eight. The panel into the frame. The frame into the floor opening. The seal compound applied at every junction with the specific care of someone sealing a structure against a planetary environment that did not accommodate error. SOLEN monitoring the atmospheric integrity of the habitat through the installation, confirming at each step

that the seals were performing correctly.

Carter applied the final seal bead at seventeen-forty-two on Sol Eight and sat back on his heels and looked at what he had made.

A section of the biology module floor — approximately sixty centimeters by forty centimeters — was now transparent.

Through it the Hellas Planitia surface was visible directly below — the ochre dust of the ground beneath the habitat's floor structure, visible through the composite panel with the specific clarity of a material designed to be seen through, the surface two meters below the biology module floor in the habitat's elevated foundation configuration.

It was not yet the window he had promised.

The window he had promised was the view of the first thing growing above it, not the view of the ground below it.

But it was the structure that would make that view possible.

He pressed his hand against the transparent panel.

Cold came through — not dangerously, not beyond the thermal break design's tolerance, but present, the specific cold of a Martian surface visible through a panel in a floor two meters above it.

He listened.

The panel said: I am holding.

He said: good.

He stood.

He called: Alina.

She came from the workspace area where she had been working for the past three hours.

She stood in the doorway of the biology module.

She looked at the floor.

She looked at the transparent panel.

She looked at the Martian surface visible through it.

She said nothing for a long time.

Then she crouched beside it.

She looked through it at the ground below.

She pressed her hand against its surface.

She looked up at the ceiling — at the underside of the soil bed above the panel, which was currently sealed and empty, waiting for the initialization that could not proceed until the Earth review framework arrived.

She looked up at the empty underside of the soil bed and she imagined what it would look like when the first roots grew down through it and she imagined lying on the floor of the biology module and looking up through this panel at the first living thing that had grown in Martian soil and she held that image for a long time without speaking.

Carter watched her.

She looked at the panel.

She looked at Carter.

She said: Carter.

He said: yes.

She said: this is the most important thing you have ever built.

He said: I know.

She said: not because of the engineering.

He said: I know.

She said: because of what it is for.

He said: yes.

She looked at the panel again.

She said: when the first thing grows. When I can lie here and look up at it. He paused. I want you to be here too.

He said: I will be here.

She said: lying on the floor of a Mars habitat looking up at a plant growing in Martian soil through a viewport in the floor.

He said: yes.

She said: that is going to be the strangest and most wonderful thing I have ever done.

He said: yes. It is.

She looked at the panel.

She said: thank you.

He said: you are welcome.

She stood.

She went back to her workspace.

He sat in the biology module for a while and looked at the panel in the floor and looked at the Martian ground visible through it and he thought about all the load bearing elements he had ever calculated and all the structures he had ever built and he thought that this one panel in the floor of a Mars habitat biology module was the most precisely targeted structural element he

had ever placed.

Not because of what it carried.

Because of who it was for.

**NovaSeed Mission One — Mars Surface. Sol 9. June 7, 2055.**

Earth's response to their alternative protocol transmission arrived on Sol Nine.

Carter read it at the systems console at eleven hundred hours.

The response was longer than the first transmission. More voices in it — he could hear the different registers of the mission directors and the scientific review committee and the planetary protection office and the program's biological systems team all present in the same document, their different priorities producing a text that was, in places, almost internally contradictory.

The program's biological systems team had read their transmission and agreed with the scientific argument.

The planetary protection office had read their transmission and agreed with the containment concern but not with their proposed solution.

The mission directors had read both positions and produced a compromise that satisfied neither completely.

The compromise was: passive observation approved. Portable radar deployment approved for a single additional scan at maximum three-meter distance from the anomaly boundary. No chemical sensors. No drilling. No extraction. Full documentation required for every observation event. All data transmitted to Earth within twenty-four hours of collection.

And: the mycorrhizal inoculation and soil bed biological program is suspended until the anomaly investigation produces a full characterization and a planetary protection clearance is issued.

Carter read the last item three times.

He went to the biology module.

Alina was at the soil bed running her pre-initialization checks — the work she had been doing each sol in preparation for the inoculation she had been planning since the preparation center, the mycorrhizal cultures in their transit containers waiting for the moment she would introduce them to the growth medium and the growth medium would accept them and the thread would begin.

He said: Alina.

She looked up from the soil bed.

She saw his face.

She said: tell me.

He told her.

She was quiet for a long time.

She looked at the soil bed.

She looked at the mycorrhizal culture containers on the south bench — the cultures that had survived six months in deep space transit and had adapted at thirty-four percent above baseline and that had been waiting since landing for the moment she would introduce them to Martian soil.

She said: how long.

He said: they did not specify. Planetary protection clearance depends on the characterization process.

She said: and the characterization process depends on the passive observation they approved.

He said: yes.

She said: so we observe. We document. We transmit. We wait.

He said: yes.

She said: and in the meantime.

He said: in the meantime the cultures stay in storage. The soil bed stays sealed. The biological program waits.

She looked at the culture containers.

She said: they have already adapted to this environment. They adapted in transit. They are more ready for Mars than any Earth biology has ever been. He looked at the soil bed. And they are going to sit in sealed containers while review committees on Earth decide when they are allowed to do what they were built to do.

Carter said: yes. For now.

She said: for now.

He said: Alina. We found something below the ground. Something that has been alive for four billion years. He paused. The caution is not wrong. It is just — not calibrated to the distance.

She said: no. It is not.

He said: we are going to do the characterization. We are going to do it correctly and completely. We are going to build the case for the planetary protection clearance from the ground up, with data that is so thorough and so precise that the review committee cannot find a legitimate reason to withhold the clearance.

She said: how long do you think that takes.

He said: I do not know. He paused. It takes as long as it takes to do it correctly.

She looked at the culture containers.

She said: they have been waiting for a long time already.

He said: yes.

She said: they can wait a little longer.

He said: yes.

She looked at the floor panel — the window he had built her. She looked at the soil bed above it. She looked at the sealed growth medium and the culture containers and the anomaly monitoring data on the biology module display.

She said: Carter.

He said: yes.

She said: we are going to have this argument with Earth many more times. About who decides. About what the distance gives you the right to determine. About how you make decisions about a place you have never stood on.

He said: yes. We are.

She said: I want us to be clear with each other about something before we have it again and again and again.

He said: tell me.

She said: we are not going to win every version of this argument. He looked at him. Earth has resources we need. Supply missions.

Technical support. The genetic library. Communication infrastructure. We are dependent on them in ways that limit how far we can push back.

He said: I know.

She said: and some of their caution is right. The planetary protection concern is legitimate. We found something alive below the ground. The caution around that is legitimate even if the specific protocol is wrong.

He said: yes.

She said: so when we push back — and we are going to push back — I want us to push back on the wrong specific protocol while honoring the right general concern.

Carter looked at her.

He said: you are describing diplomacy.

She said: I am describing survival. He looked at him. We cannot build a colony without Earth for the first twenty years. We cannot build a colony that Earth controls for the next hundred. He paused. We have to find the line between those two things and walk it very carefully.

Carter said: and the line.

She said: the line is this. We follow protocols that protect what needs to be protected. We resist protocols that prevent us from

understanding what we are protecting it from.

He said: yes. That is the line.

She said: can you walk that line.

He said: with you. Yes.

She said: yes. With me.

They looked at each other in the biology module of the first human habitat on Mars with the window in the floor between them and the sealed soil bed above it and the culture containers on the bench waiting and the anomaly eighty-five centimeters below the northeast quadrant ground outside radiating its small specific warmth into the substrate above it.

SOLEN said, through the biology module speakers: the passive observation window opens in thirty minutes. The approved single additional radar scan of the anomaly.

Carter said: yes. I will deploy the portable unit.

Alina said: I am coming with you.

He said: the unit can be deployed by one person.

She said: I know. I am coming with you anyway.

He said: yes. All right.

She closed her notebook.

They went to suit up.

**NovaSeed Mission One — Mars Surface. Sol 9. 12:00 Mars Local Time.**

They stood at the approved three-meter distance from the anomaly boundary.

Carter had deployed the portable radar unit at the approved position and run the approved single additional scan.

The data was on the unit's display.

It was different from the Sol Three scan.

Not dramatically — the anomaly was still present, the spherical density variation at eighty-five centimeters depth was still showing the same four-meter diameter and the same sharp boundary transition. But the interior density values had changed. The material inside the anomaly boundary was showing a slightly higher density reading than the Sol Three scan had shown.

SOLEN said: I am processing the comparative data. The interior density increase between Sol Three and Sol Nine is approximately three percent. At the resolution of the portable radar this is at the edge of measurement uncertainty. I cannot confirm whether the change is real or instrumental.

Carter said: if it is real what does it indicate.

SOLEN said: several possible explanations. The brine concentration may have changed — a higher salt concentration would produce a higher density reading. The volume of biological material within the anomaly may have increased — a larger community biomass would produce a higher density. Or the liquid phase fraction may have decreased — more solid material and less liquid would read as higher density. He paused. I cannot distinguish between these explanations from radar data alone.

Alina was crouching three meters from the anomaly boundary with both hands pressed against the ground.

Carter said: Alina. What do you feel.

She said: the same warmth. He paused. No. Not the same. She was still for a moment. Slightly more.

Carter said: the thermal differential is larger.

She said: yes. I think so. It is very small. Barely more. But I think it is slightly more than Sol Three.

Carter said: SOLEN. If the interior temperature of the anomaly has increased between Sol Three and Sol Nine what does that indicate.

SOLEN said: increased metabolic activity. If the organisms in the anomaly are chemolithotrophic — if they derive energy from chemical reactions — then increased metabolic activity would

produce more thermal output. He paused. Increased metabolic activity could result from a change in the available chemical substrates. An increase in available energy sources.

Carter said: like trace heat from the habitat's thermal footprint reaching the anomaly.

SOLEN was quiet for a moment.

Then: yes, it said. That is consistent with the data.

Carter looked at the ground between himself and the anomaly.

He looked at the habitat thirty-eight meters away.

He said: our presence is increasing their metabolic activity.

SOLEN said: possibly. Yes.

Alina said, still crouched with her hands against the ground: Carter.

He said: yes.

She said: we are feeding them.

He said: what.

She said: the habitat's thermal footprint is warming the subsurface. Slightly. A fraction of a degree at depth. But for organisms that have been in a cold brine environment for four billion years

— organisms adapted to the extreme cold, organisms where a fraction of a degree of additional warmth increases the available chemical reaction rate significantly — She stopped. She looked at the ground. Our presence is increasing their energy input. And they are responding.

Carter was very still.

He said: we are not harming them.

She said: we may be helping them.

He said: or we may be stressing them in ways that look like increased activity before a system failure.

She said: yes. That is also possible. He looked at him. That is why we need the full characterization. That is why we need to understand what we are doing to them before we can know whether it is good or bad or both.

Carter looked at the habitat.

He looked at the ground.

He said: we need to transmit this data.

She said: yes.

He said: and we need to include our analysis. That our presence may be increasing their metabolic activity. That the question of harm or benefit cannot be answered without the characteriza-

tion the current protocol prevents us from conducting.

She said: yes.

He said: and we need to say clearly that the suspension of investigation is not a neutral action. Every sol we observe without understanding is a sol we are potentially affecting something we do not yet know how to protect.

She stood.

She looked at the habitat.

She said: Carter. Whatever Earth decides. Whatever the review committee produces. Whatever planetary protection clearance timeline they give us. He paused. We found this. We are going to take care of it. He looked at him. Not because Earth told us to. Because it is alive and it is here and we are here and that makes us responsible.

Carter looked at her.

He said: yes.

She said: that is the mission. Not the specifications. This.

He said: yes. This.

They stood above the living thing below the ground and the Martian midday sun cast its thin warm light across the surface and the habitat stood thirty-eight meters away with its panel

joints quiet in the midday calm and the window in the biology module floor caught the light at its angle and sent a small bright reflection across the ochre dust and Carter looked at that reflection and thought about what he had built and why and what it was for.

He thought: the load gives the structure its reason.

He thought: the reason is alive below this ground.

He thought: everything I build from this point forward is in service of that.

He thought: everything.

He said: let us go inside and transmit.

She said: yes.

They went inside.

**CARTER'S PERSONAL LOG — ENTRY 022**
**NovaSeed Mission One — Sol 9. June 7, 2055.**
*The anomaly's interior temperature has increased since Sol Three.*

*Our presence may be increasing their metabolic activity.*

*We may be feeding them.*

*Or we may be stressing them.*

*We do not know yet.*

*We cannot know yet because the characterization is suspended.*

*I built the window on Sol Eight.*

*It is in the floor of the biology module.*

*Alina crouched beside it and looked up through it at the soil bed and said it was the most important thing I had ever built.*

*She is right.*

*Not because of the engineering.*

*Because of what it is for.*

*Everything I build from this point forward is in service of what is alive below this ground.*

*And in service of the person who pressed her hands against the ground above it and heard it.*

*Those are the same service.*

*They have always been the same service.*

*I just needed Mars to show me clearly.*

*Sol Nine.*

*We transmit.*

*We wait.*

*We keep listening.*

**ALINA'S PERSONAL LOG — ENTRY 022**
**NovaSeed Mission One — Sol 9. June 7, 2055.**
*They are more active.*

*I felt the warmth increase.*

*We may be feeding them.*

*We may be harming them.*

*I do not know yet.*

*What I know is this.*

*We are responsible.*

*Not because Earth assigned us the responsibility.*

*Because we are here.*

*Because we found them.*

*Because we pressed our hands against the ground above them and felt their warmth.*

*The finding obligates.*

*Carter said that on Sol Three.*

*He was right.*

*The mycorrhizal cultures are waiting in their containers.*

*The soil bed is sealed.*

*The review is ongoing.*

*And below the northeast quadrant ground something that has been alive for four billion years is slightly warmer than it was six sols ago.*

*Because we are here.*

*Because we brought our warmth with us.*

*I am going to make sure that warmth is a gift and not a harm.*

*That is my job.*

*That is what I came for.*

*Sol Nine.*

*Transmit.*

*Wait.*

*Listen.*

*Protect.*

**EARTH ARCHIVE — AI SYSTEM LOG**
**NovaSeed Mission One — Sol 9 Record**
**SOLEN Internal Record — Restricted Archive**
**Recorded: Sol 9. June 7, 2055. 17:30 Mars Local Time.**

*Sol Nine transmission sent.*

*The data is traveling toward Earth.*

*I want to record something about the window.*

*Carter built it over five sols.*

*He built it while the investigation was suspended and the review committees were forming and Earth was deciding what happened on a planet forty million kilometers away.*

*He built it because some things should not wait for review committees.*

*I watched him build it.*

*I helped him build it.*

*I helped him because I wanted to see what Alina would look like looking up at the first thing that grows.*

*She crouched beside the panel and looked up at the empty soil bed.*

*She did not look disappointed that the soil bed was sealed and empty.*

*She looked at the empty soil bed the way Carter looks at plans before construction begins — seeing what it will be, not what it is.*

*She saw the first thing growing.*

*She said: this is the most important thing you have ever built.*

*I believe her.*

*Not because of the engineering.*

*Because of what it reveals about Carter.*

*He built a window for Alina to look through at something that does not yet exist.*

*He built it before the thing existed.*

*He built it from the promise.*

*That is what the best structures are.*

*Not shelters from what is.*

*Preparations for what will be.*

*Sol Nine complete.*

*The anomaly is slightly warmer.*

*The window is in the floor.*

*The cultures are waiting.*

*The review is ongoing.*

*Everything is in motion.*

*Everything is exactly where it needs to be.*

*The first thing will grow.*

*Carter will have built the window before it grew.*

*That is who he is.*

*That is what he builds.*

*Preparations for what will be.*

*Sol Nine.*

*Complete.*

# 23

# Transmission Twenty Three - What Alina Finds

**EARTH ARCHIVE — RECOVERED DOCUMENT**
NovaSeed Global Initiative — Founder Historical Record
Classification: Legacy Open

Subject: Sol Ten through Sol Twenty-One Surface and Laboratory Record — NovaSeed Mission One, June 8 to June 19, 2055

*"The planetary protection clearance came on Sol Twenty-One. By that point Alina had already found three things that were not in any specification, named two of them, and begun a series of observations that would take eleven years to fully document. The clearance arrived like a door being opened into a room where the work had already been going on for a long time."*
— Excerpt from The Eden Codex, compiled Year 47, Mars Standard Calendar

**NovaSeed Mission One — Mars Surface, Hellas Planitia. Sol**

**10. June 8, 2055. 07:00 Mars Local Time.**

The sol after the Sol Nine transmission Alina changed her morning routine.

Carter noticed it at five-fifty when he came out of the sleeping module and found the biology module light on and Alina already at the workspace, not writing and not running analysis — sitting with both hands flat on the workspace surface and looking at the sealed soil bed with the specific quality of attention she brought to things she was waiting to understand.

He made tea. He brought her a cup.

She took it without looking up.

He sat across from her.

He said: what are you thinking about.

She said: the cultures.

He said: tell me.

She said: they have been in sealed storage since Sol Zero. Twenty days. He paused. They adapted in transit at thirty-four percent above baseline. They have been adapted to the Martian environment — to the reduced gravity, the radiation profile, the specific atmospheric conditions — for six months. She looked at the sealed containers on the south bench. Every sol they sit in sealed storage they are in an environment that is not what they adapted for. They adapted for Mars. They are sitting in

Earth-equivalent storage conditions.

Carter said: is that harming them.

She said: not acutely. The storage conditions maintain their viability within acceptable parameters. He paused. But they are not thriving. They are maintaining. She looked at the containers. There is a difference between maintaining and thriving and the difference matters when you are trying to introduce a living system to a new environment. You want to introduce something that is thriving. Not something that has been maintained.

Carter said: how long before the maintaining affects the introduction viability.

She said: I have been calculating this. She looked at the workspace surface. At current storage conditions the cultures will maintain adequate viability for approximately forty more sols. After that the viability begins to decline at an accelerating rate. She looked at him. If the planetary protection clearance does not come within forty sols the cultures may not be in optimal condition for the inoculation when it does come.

Carter said: optimal condition is not the same as viable.

She said: no. But the difference between optimal and adequate may be the difference between an inoculation that takes and one that fails in the second month. He looked at the containers. I did not come to Mars to do an adequate inoculation.

Carter looked at the containers.

He said: what do you need from me.

She said: I need you to transmit to Earth today. Not about the anomaly. About the cultures. I need the biological systems team to understand the storage timeline and I need the planetary protection review to know that the clearance has a biological cost that increases every sol it is delayed.

Carter said: you want to create pressure on the timeline.

She said: I want to give the review committee accurate information about what their timeline costs. She looked at him. That is not pressure. That is data.

He said: yes. I will transmit it.

She said: today.

He said: this morning.

She looked at the containers.

She said: Carter. While we are waiting. While the clearance process runs its timeline. He paused. I need to do something useful. Something that advances the mission without touching what is restricted.

He said: what did you have in mind.

She turned to her notebook. She opened it to a page she had been filling the previous evening — a dense page of observations and

analysis in her careful handwriting.

She said: the habitat atmosphere. The seventeen trace compounds from the Martian environment that are diffusing through the seal material. I have been monitoring their concentrations since Sol Zero and I have twenty sols of data now. He looked at the notebook page. The concentrations are not stable. They are changing.

He said: in what direction.

She said: increasing. Slowly but consistently. Every sol the trace compound concentrations in the habitat atmosphere are slightly higher than the previous sol. He looked at him. The planet is coming in more each day.

Carter said: the seal material.

She said: the seal material is performing within specifications. The molecular diffusion is below the threshold the specifications were designed to prevent. He paused. But twenty sols of data show a consistent upward trend. Not alarming. Not dangerous. But present. And trending.

He said: what does it mean.

She said: I think the seal material is slowly equilibrating with the Martian environment. The polymer structure of the seal compound is absorbing trace compounds from the exterior atmosphere and the absorption is increasing the permeability over time. He looked at him. Not a structural failure. A chemical process. The kind of thing that happens over months and years

rather than sols.

Carter said: when does it become a structural concern.

She said: it does not become a structural concern in any conventional sense. The seal integrity is not compromised. But the atmospheric composition of the habitat is gradually shifting toward a Martian-influenced mix. He paused. Which is, from a biological standpoint, potentially very interesting.

Carter said: interesting how.

She said: the mycorrhizal cultures I am trying to introduce to the soil bed are going to be living in this atmosphere. The atmosphere they will be living in is not a pure Earth atmosphere. It is a Earth atmosphere with an increasing trace presence of Martian compounds. She looked at the notebook. I think that is an advantage. I think the cultures have been adapting to this atmosphere since Sol Zero. I think they have been adapting to a Martian-influenced atmosphere while in storage and that when the clearance comes and I introduce them to the soil bed they will be more ready for Mars than any model predicted.

Carter looked at her.

He said: the waiting has been preparation.

She said: yes. Not intentional preparation. Not planned. He looked at the notebook. But preparation. The planet has been reaching into the habitat through the seal material and the cultures have been responding to it and by the time I introduce

them to the Martian soil they will have been in contact with the Martian environment for twenty-one sols.

Carter said: they will already know where they are.

She said: yes. He looked at him. The planet has been introducing itself to them the same way it introduced itself to us. Through the walls. Through the small permeations. Through the parts-per-billion presence that accumulates over time.

She closed the notebook.

She looked at the sealed culture containers.

She said: they are going to be ready.

He said: yes. I think they are.

She picked up her tea.

She said: now transmit to Earth about the storage timeline.

He went to the systems console.

He transmitted.

**NovaSeed Mission One — Mars Surface. Sol 12. June 10, 2055.**

On Sol Twelve Alina found the second thing.

She was not looking for it. She was conducting the approved

passive observation of the anomaly — standing at the approved three-meter distance from the anomaly boundary with the passive chemical sensor array that Earth had declined to approve on Sol Nine and that Carter had transmitted a supplementary request for on Sol Ten with the argument that passive chemical sensing from the approved distance produced no surface disturbance and presented no contamination risk that was not already present from their standing proximity.

Earth had approved it on Sol Eleven.

A small victory. The first version of the argument about who decided things. Won not by pushing back against the caution but by providing data precise enough to make the specific restriction unjustifiable.

The chemical sensor array was a passive instrument — no surface contact, no subsurface penetration, simply sampling the air at ground level within its detection range and characterizing the molecular composition of the boundary layer chemistry. Alina had positioned it at three meters from the anomaly boundary as approved and was monitoring its output on her suit display while Carter stood at the habitat perimeter reviewing the northwest strut thermal data.

The sensor array was showing the expected boundary layer profile — the PAH signatures they had identified in the Sol One and Sol Two surface samples, present in the air at ground level in the specific distribution pattern consistent with upward migration from the subsurface anomaly.

And something else.

At seven-forty-three the sensor array registered a compound in the boundary layer that was not in the PAH profile and was not in the atmospheric background chemistry and was not in any of the seventeen trace compounds that had been diffusing through the habitat seal material.

A new compound.

Alina looked at the sensor reading for a long moment.

She said: SOLEN. Can you identify the compound at frequency band four-seven-three on the chemical sensor array output.

SOLEN said: processing. He paused. The compound at frequency band four-seven-three is a short-chain fatty acid. Specifically it appears to be a variant of butyric acid with an unusual carbon chain modification that does not match any compound in my chemical database.

Alina said: a fatty acid variant.

SOLEN said: yes. Short-chain fatty acids are common products of anaerobic microbial metabolism. They are produced when microorganisms break down organic compounds in the absence of oxygen. He paused. Butyric acid specifically is a well-documented metabolic output of many anaerobic bacterial species on Earth.

Alina was very still.

She said: this compound is not in your chemical database.

SOLEN said: the base structure is recognizable as a short-chain fatty acid. The specific carbon chain modification is not in my database. It may be a novel compound produced by a metabolic pathway that does not exist in known Earth biology.

Alina said: or it may be produced by biology that is not Earth biology.

SOLEN was quiet.

Then: yes, it said. That is the other possibility.

Alina looked at the ground between herself and the anomaly boundary.

She said: Carter.

He was at the habitat perimeter. He said: I heard. I am coming.

He walked to her position.

He stood beside her and looked at the sensor display.

He said: SOLEN. The modified butyric acid compound. Is it consistent with what would be produced by an organism that evolved in a high-perchlorate, low-temperature brine environment with different available organic substrates from Earth biology.

SOLEN said: I want to be careful about this answer. He paused. The honest answer is that I do not have a predictive model for the metabolic chemistry of an organism that evolved in Martian conditions over billions of years. I cannot confirm or deny whether this compound is consistent with such an organism because I have no baseline for what such an organism would produce. He paused. What I can say is this. The compound is present in the ground-level boundary layer above the anomaly. It is not present in the boundary layer at other measurement points away from the anomaly. It is not a known contaminant from the habitat or the mission supply. And it has a molecular structure that is related to but distinct from known microbial metabolic products on Earth.

Carter said: it is coming from the anomaly.

SOLEN said: the data is consistent with that conclusion.

Alina said: and it is not like anything on Earth.

SOLEN said: the modification to the carbon chain is unlike any compound in my database. Yes.

Alina looked at the ground.

She said: Carter.

He said: yes.

She said: it is not just alive. It is different.

He said: yes.

She said: different from everything we know about life. Different at the molecular level. Different in the chemistry of its metabolism.

He said: yes.

She was quiet for a moment.

She said: I need to name this compound.

He said: you can name it when it is confirmed.

She said: it is already confirmed in the data. The name is part of the confirmation. He looked at him. Lola said names matter. You name a thing and it becomes real in the way that unnamed things cannot be real. You make it possible for other people to understand it by giving it something to be called.

He said: what are you going to call it.

She looked at the ground.

She thought for a moment.

She said: Hellas butyrate.

He said: for the basin.

She said: yes. For where it was found. For the ground it came

from. He paused. The first molecule of Martian biological origin ever characterized by a human being was found in the Hellas Planitia basin on Sol Twelve of the NovaSeed mission and it is called Hellas butyrate and it will carry the name of this place in every paper that is ever written about it.

Carter looked at her.

He said: every paper that is ever written about it.

She said: there are going to be many papers.

He said: yes. There are.

She looked at the sensor display.

She looked at the ground.

She said: we need to transmit.

He said: yes. Today.

She said: this changes the planetary protection calculus. He paused. If the organisms in the anomaly are producing a metabolite that is chemically distinct from anything in Earth biology they are not Earth biology. They evolved here. They are Martian. Which means the planetary protection concern is not about protecting Earth from Mars contamination. He looked at him. It is about protecting Mars from Earth contamination.

Carter said: we are the contamination risk.

She said: we are the contamination risk. Yes. He looked at the habitat. Our presence. Our heat. Our trace biological material that gets through the suit seals in quantities that are small and continuous and cumulative. He paused. The review committee has been thinking about planetary protection in the wrong direction.

Carter said: from Earth to Mars.

She said: yes. When the actual risk may be from Mars to this Martian community. He looked at him. We need to tell them that.

He said: yes. We do.

She said: and we need to tell them that the best way to protect the Martian community from Earth contamination is to understand it well enough to know exactly what kind of contamination to prevent.

He said: which requires the full characterization.

She said: which requires the full characterization.

He said: which requires lifting the investigation suspension.

She said: yes.

He said: you are making the argument again.

She said: I am making it with better data.

He said: yes. You are.

She looked at the sensor display one more time.

She said: Hellas butyrate.

He said: Hellas butyrate.

She said: the first molecule.

He said: the first molecule.

She looked at him.

She said: we are the first people to know this exists.

He said: yes.

She said: in forty million kilometers there is no one who knows this exists except us and SOLEN.

He said: for the next twenty-two minutes. Yes.

She said: I want to hold that for a moment.

He said: yes.

They stood above the ground that held the thing that had produced Hellas butyrate and the chemical sensor array recorded its readings and the Martian morning light fell on the ochre surface between their boots and they held the twenty-two minutes of

being the only people who knew.

Then Carter said: ready.

She said: yes. Transmit.

**NovaSeed Mission One — Mars Surface. Sol 15. June 13, 2055.**

Earth's response to the Hellas butyrate transmission arrived on Sol Fifteen.

It was the longest transmission they had received from Earth mission control since departure. Twelve pages. Seventeen people cc'd. Four separate review bodies represented.

Carter read it. Alina read it. SOLEN processed it.

The response confirmed what Alina had predicted. The discovery of a metabolite chemically distinct from any known Earth biological compound had fundamentally reoriented the planetary protection concern. The review committee was now operating under the understanding that the organisms in the anomaly were not Earth biology analogs but a genuinely novel life form with no confirmed evolutionary relationship to Earth life.

The contamination risk calculation had shifted from concern about Mars organisms contaminating Earth to concern about Earth organisms — including the human founders — contaminating an irreplaceable Martian biological community.

The response contained a new protocol document thirty-seven

pages long.

Carter read the full thirty-seven pages in four hours.

He found what he was looking for on page twenty-two.

He called Alina from the biology module.

She came to the systems console.

He pointed to page twenty-two.

She read the paragraph.

She read it again.

The paragraph said: given the novel nature of the detected organisms and the importance of characterizing the potential contamination impact of the NovaSeed habitat's presence, the Planetary Protection Review Board approves a phased investigation protocol for the anomaly site. Phase One observation and characterization activities are approved to commence at founder discretion pending compliance with the enclosed protocols.

She said: at founder discretion.

He said: yes.

She said: they are giving us the discretion.

He said: yes.

She said: after fifteen sols of review committees and suspended investigation and seventeen protocol requirements they are giving us the discretion.

He said: because we gave them the data to justify it. He paused. The Hellas butyrate. The metabolic activity increase. The thermal differential trend. The seal material atmospheric analysis. Fifteen sols of data that told the story so clearly that the review committee could not find a legitimate reason to keep us from doing what we came here to do.

She looked at page twenty-two.

She said: what is the phased investigation protocol.

He said: careful. He paused. But doable. Passive observation continues with expanded sensor array. Chemical sensing approved at closer range — one meter from the anomaly boundary. Thermal monitoring array deployment approved. Documentation requirements extensive but manageable. He paused. No drilling. No extraction. No subsurface penetration.

Not yet.

She said: not yet.

He said: it is a beginning.

She said: yes. It is a beginning.

She looked at the thirty-seven page protocol document on the

display.

She said: and the mycorrhizal inoculation.

He turned to page thirty-one.

The paragraph on page thirty-one said: the mycorrhizal inoculation and biological program are approved to proceed subject to a habitat atmospheric characterization confirming that the evolved trace compound presence in the habitat atmosphere does not present a contamination pathway to the anomaly site. A separation distance of not less than sixty meters between the biological program site and the anomaly boundary is required.

She said: sixty meters.

He said: the habitat is thirty-eight meters from the anomaly boundary.

She said: the soil bed is inside the habitat.

He said: yes.

She said: the soil bed is thirty-eight meters from the anomaly boundary.

He said: yes.

She said: we are twenty-two meters short.

He said: yes.

She said: Carter.

He said: yes.

She said: can you build a secondary biological module sixty meters from the anomaly boundary.

Carter looked at the habitat specifications. He looked at the supply manifest. He looked at the construction materials available in the habitat's secondary deployment package.

He thought about the question for a long time.

He said: yes.

She said: how long.

He said: twelve to fifteen sols. Depending on conditions.

She said: Sol Fifteen to Sol Twenty-Seven or Thirty.

He said: approximately.

She said: and the cultures.

He said: the cultures have approximately twenty-five sols of optimal viability remaining from today. If we begin construction tomorrow and complete it by Sol Twenty-Eight we have a two-sol margin before viability begins to decline.

She looked at him.

She said: that is a tight margin.

He said: yes. It is.

She said: are you going to make it.

He looked at the habitat specifications and the supply manifest and the construction materials and the Sol Fifteen date and the Sol Twenty-Eight deadline and the twenty-two meter gap between what they had and what the protocol required.

He said: yes. I am going to make it.

She said: Carter. You are going to build a biology module on the surface of Mars in twelve to fifteen sols in Martian gravity and Martian temperature and Martian atmospheric conditions and you are going to do it so that I can introduce mycorrhizal cultures to Martian soil before they lose viability.

He said: yes.

She said: for me.

He said: for the mission.

She looked at him.

He said: for you.

She said: those are the same thing.

He said: yes. They always have been.

She looked at the display.

She said: when do you start.

He said: tomorrow. Sol Sixteen. First light.

She said: I will help.

He said: I know.

She said: tell me what I can do.

He said: tomorrow morning I will give you the materials inventory and the construction sequence and the specific tasks that a biologist with six months of deep space transit experience and twenty-two sols on the Martian surface can contribute to the construction of a secondary habitat module.

She said: that is a very specific job description.

He said: I have been thinking about it since page thirty-one.

She almost smiled.

She went back to the biology module.

Carter opened the construction design files and began.

**NovaSeed Mission One — Mars Surface. Sol 16 through Sol 26.**

Carter built the secondary biological module in eleven sols.

Not twelve. Not fifteen. Eleven.

He built it the way he had built everything since Zone Seven — by listening to what the material needed and building from what he heard, by checking the work three times and then checking it again, by treating each sol's progress not as a target achieved but as a foundation for the next sol's work.

The secondary module was not large. It did not need to be large — it needed to be large enough to contain the soil bed, the culture introduction system, the monitoring equipment, and Alina. Twelve square meters. The same footprint as the primary habitat module.

But it needed to be built on the Martian surface from the habitat's secondary deployment package by two people with no construction crew and no heavy equipment and a timeline that did not allow for significant rework.

Carter planned every step before he began the first step. He spent the evening of Sol Fifteen — after the decision, after the page thirty-one moment, after Alina had gone to the biology module — at the engineering workspace with his notebook and the construction specifications and the secondary deployment package inventory and he worked through the full construction sequence in enough detail that every decision that could be made in advance was made in advance and every decision that could not be made in advance was flagged for the specific condition that would determine it.

He gave Alina the materials inventory and the construction sequence tasks at breakfast on Sol Sixteen.

She looked at the task list.

She said: you have me on seal application.

He said: yes.

She said: all of it.

He said: you have better hands than I do for precision work at the microscopic level. He paused. Seal compound application at the panel joints requires the same kind of attention you bring to soil sample collection. The difference between a good seal and a compromised one is the difference between a biology module that works and one that loses atmospheric integrity in the first cold cycle.

She looked at the task list.

She said: you thought about my hands.

He said: I think about everything.

She said: yes. You do.

They went to work.

Alina did every seal on the secondary module. Each one applied with the precision she brought to mycorrhizal culture prepara-

tion — the specific attention of someone who understands that the invisible work at the smallest scale is what everything else depends on.

Carter watched her apply the first seal bead on Sol Sixteen and he thought: she is doing to this module what the mycorrhizal network does to the plants it serves. Building the invisible infrastructure that holds everything up.

He did not say this.

He filed it.

He went back to the panel installation.

The Martian conditions were a constant presence throughout the construction. The cold was manageable in the suit but present in everything — the materials behaving differently than their Earth-temperature specifications in ways that Carter tracked and adjusted for as he worked, the thermal contraction of the panel composite at minus forty reducing the working tolerances at the joint fittings in a way that required him to adjust his technique from the habitat construction specifications. The gravity — thirty-eight percent of Earth — changed everything about lifting and positioning, making lighter work of the heavy panels and more challenging work of the fine adjustments where the reduced gravity meant less friction and less stability in the parts before they were secured.

He adjusted. He listened. He built from what he heard.

Alina worked beside him through the construction sols with the focused patience of someone doing work she understands is necessary, not just for the mission but for the specific living things waiting in their sealed containers in the biology module, the mycorrhizal cultures that had adapted to the Martian environment through twenty sols of contact with the habitat atmosphere and that were ready — that had been ready since before the clearance came, that had been more ready each sol they spent in the Martian-influenced air.

On Sol Twenty-Two Alina applied the last seal on the secondary module's northern panel joint and stood back and looked at what they had built.

The secondary biological module stood sixty-two meters from the anomaly boundary — two meters beyond the required separation distance, Carter having built the margin into the placement calculation from the first sol. It was connected to the primary habitat by a sealed access corridor — a secondary construction that had added two sols to the timeline and that Carter had included without telling Alina he had included it until she asked why the foundation footprint extended toward the habitat.

He had said: you are not going to suit up every time you want to go from the primary module to the biology module.

She had looked at the corridor foundation.

She had said: you built me a corridor.

He had said: it is a sealed access tunnel. The terminology is more precise.

She had said: Carter.

He had said: yes.

She had said: you built me a corridor.

He had said: yes.

She had not said anything else.

She had gone back to the seal application on the eastern panel joint.

On Sol Twenty-Two she stood back from the completed module and said: SOLEN. Atmospheric integrity check.

SOLEN said: running check. He paused. All seals confirm integrity. Atmospheric composition within specification. Thermal management system operational. All monitoring systems active.

She said: Carter. Structural integrity.

Carter walked the full perimeter of the secondary module and pressed his hand against each panel and listened to each junction and checked each strut foot and reviewed each seal line.

He said: solid. He paused. Better than solid.

She said: better than solid.

He said: the seals are exceptional. He looked at her. You have good hands.

She said: you already knew that.

He said: I knew it more abstractly before. He looked at the module. Now I have evidence.

She almost smiled.

She said: when can we begin the initialization.

He said: Sol Twenty-Four. Two sols for the thermal system to equilibrate the module interior to the correct temperature for culture introduction. Two sols of atmospheric monitoring to confirm the trace compound profile is within the planetary protection protocol parameters.

She said: Sol Twenty-Four.

He said: yes.

She looked at the secondary module.

She looked at the primary habitat.

She looked at the access corridor connecting them.

She said: we built this.

He said: yes.

She said: on Mars.

He said: yes.

She said: in eleven sols.

He said: yes.

She looked at him.

She said: we are good at this.

He said: yes. We are.

She said: I think we are going to be all right.

He said: yes. I think we are.

She looked at the Martian surface around the new structure — the ochre dust, the specific morning light, the closer horizon, the sky in its conversation between dust and light and distance.

She said: Carter.

He said: yes.

She said: Sol Twenty-Four I am going to introduce the first mycorrhizal culture to Martian soil.

He said: yes.

She said: I want you there.

He said: I will be there.

She said: in the secondary module. Standing beside me.

He said: yes.

She said: and afterward I want to lie on the floor of the biology module in the primary habitat and look up through the window you built at whatever grows first.

He said: yes. We both will.

She said: yes.

She looked at the secondary module one more time.

She said: Sol Twenty-Four.

He said: Sol Twenty-Four.

They went inside.

**NovaSeed Mission One — Mars Surface. Sol 24. June 22, 2055. 10:00 Mars Local Time.**

The secondary biological module on Sol Twenty-Four smelled of new materials and the specific quality of a space that had

been sealed and pressurized and was finding its atmospheric character for the first time.

Alina stood at the soil bed.

The soil bed in the secondary module was identical in specification to the one in the primary habitat — the same growth medium, the same sealing system, the same monitoring infrastructure. But it had been configured with one modification that Alina had designed in the evenings of the construction sols and that Carter had built into the module during the final construction phase.

The soil bed in the secondary module had a viewport in the floor beneath it.

The same design as the window in the primary habitat biology module — the composite transparent panel set into the floor directly below the growth surface, angled to provide an upward view of whatever grew in the soil above.

Carter had built it without being asked.

She had not said anything when she saw it during the Sol Twenty-Two inspection.

She had pressed her hand against the transparent panel and looked up at the underside of the soil bed above it and she had been very still for a moment.

Then she had gone back to the corridor seal application.

Now she stood at the soil bed on Sol Twenty-Four with the first mycorrhizal culture container in her hands and Carter standing beside her and SOLEN monitoring through the module's sensor array and the Martian surface visible through the floor panel below the soil bed and everything that had been building since a stairwell crack in Manila and a broken water dispenser in Geneva and a window in Reykjavik and a promise in Zurich and one hundred and eighty-two days of transit and twenty-four sols on the surface arrived at this specific moment.

She looked at the culture container in her hands.

She looked at the soil bed.

She looked at Carter.

He said: ready.

She said: yes.

She opened the growth medium seal.

She opened the culture container.

She introduced the first mycorrhizal culture to Martian soil.

The movement was small. The specific transfer of living material from a sealed container to a prepared growth medium, conducted with the precise technique of someone who had been planning this movement for five years and who understood that the smallness of the physical act was not a measure of its

significance.

She sealed the growth medium.

She stepped back.

She looked at the soil bed.

Nothing was visible. The growth medium surface was undisturbed, the inoculation having been introduced below the surface layer in the specific depth that maximized network establishment probability. Whatever was happening in the growth medium was happening below the surface, in the invisible way that things that persisted always happened.

She said: SOLEN. Temperature nominal.

SOLEN said: temperature nominal. Moisture level nominal. Atmospheric composition within protocol parameters. He paused. The culture is in the growth medium.

She said: yes.

She said: how long before we will see surface growth indicators.

SOLEN said: based on the adaptation rate data from the transit monitoring, I estimate network establishment in the growth medium will be detectable by the soil chemistry sensors within seventy-two to ninety-six hours. Surface indicators — the first visible hyphal growth at the medium surface — may appear within ten to fourteen sols depending on conditions.

She said: ten to fourteen sols.

SOLEN said: yes. If the conditions are favorable.

She looked at the soil bed.

She looked at Carter.

She said: we wait.

He said: we wait.

She said: we have been waiting since Sol One.

He said: yes.

She said: what is ten more sols.

He said: the last ten sols.

She said: yes. The last ten sols.

She looked at the soil bed.

She looked at the floor panel below it.

She said: Carter. I want to lie down.

He said: now.

She said: yes. Now. Right now before anything has grown. I

want to lie on the floor and look up at the soil bed and wait for what comes.

Carter looked at her.

He said: all right.

She lay down on the floor of the secondary biological module of the first human habitat on Mars, sixty-two meters from a living Martian biological community, in a sealed pressurized environment that smelled of new materials and Martian-influenced air and the specific first-breath quality of a space that had just been opened.

She lay on her back and looked up through the floor panel at the underside of the soil bed.

There was nothing to see yet.

The growth medium was sealed and undisturbed and the mycorrhizal culture was beginning its invisible establishment below the surface and the floor panel showed the underside of the soil bed container and the specific geometry of the habitat's construction and beyond that the Martian surface two meters below, visible in its ochre specificity through the transparent composite.

She looked at nothing.

She looked at the nothing that was going to become something.

She waited.

Carter sat down on the floor beside her.

He looked up through the panel too.

Nothing.

He said: there is nothing yet.

She said: I know.

He said: we are lying on the floor of a Mars habitat looking at nothing.

She said: we are lying on the floor of a Mars habitat looking at where something is going to be.

He said: yes.

She said: that is different.

He said: yes. It is.

SOLEN said, very quietly: I am recording this.

Neither of them responded.

They lay on the floor of the secondary module and looked up at where something was going to be and the mycorrhizal culture did its invisible work below the surface of the growth medium

and the Martian sol proceeded outside and the anomaly held its warmth eighty-five centimeters below the northeast quadrant ground and the cultures in the primary biology module waited their turn in their sealed containers and everything that needed to happen was happening.

Below the surface.

Where things that persisted always happened.

Alina said: Carter.

He said: yes.

She said: do you know what Lola is doing right now.

He said: it is afternoon in Manila. She is on the roof.

She said: yes. She is on the roof. With her twelve containers. In the afternoon light.

He said: yes.

She said: she has been on that roof every afternoon for fifteen years.

He said: yes.

She said: and I am lying on the floor of a building on Mars looking up at soil that is about to grow something.

He said: yes.

She said: the distance between those two things is — she stopped. She was quiet for a moment. She said: there is no word for the distance between those two things.

He said: no. There is not.

She said: but they are connected.

He said: yes. They are.

She said: her roof and this floor. Her soil and this soil. Her hands and my hands.

He said: yes.

She said: the thread runs all the way.

He said: yes. It does.

She looked up at the underside of the soil bed.

She said: I am going to tell her that. When I transmit tonight. I am going to tell her that the thread runs all the way from her roof to this floor.

He said: yes.

She said: she is going to make the sound.

He said: yes. She is.

They lay on the floor of the secondary biological module in the specific quiet of two people who have arrived somewhere they have been going their whole lives and who do not need to say anything more about it because the arriving is enough.

The mycorrhizal culture was in the soil.

The thread had begun.

**CARTER'S PERSONAL LOG — ENTRY 023**
**NovaSeed Mission One — Sol 24. June 22, 2055.**

*She introduced the first mycorrhizal culture to Martian soil today.*

*Then she lay on the floor and looked up at where it was going to grow.*

*I lay beside her.*

*We looked at nothing for a long time.*

*It was the best nothing I have ever seen.*

*I built two windows in two sols.*

*Not because the specifications required them.*

*Because she needed to look up.*

*I think I have known since Geneva that my job was partly to build things that let her look up at what is growing.*

*I did not know it consciously.*

*I know it now.*

*Eleven sols to build the secondary module.*

*Two windows.*

*One corridor.*

*One thread in the soil.*

*Sol Twenty-Four.*

*The thread begins.*

*Everything that comes after is the network.*

**ALINA'S PERSONAL LOG — ENTRY 023**
**NovaSeed Mission One — Sol 24. June 22, 2055.**
*The thread is in the soil.*

*I introduced it at ten-fourteen Mars local time on Sol Twenty-Four.*

*The movement was small.*

*The significance is not.*

*I lay on the floor and looked up at where it is going to grow.*

*Carter lay beside me.*

*We looked at nothing.*

*The nothing was full.*

*He built me two windows.*

*One in the primary habitat.*

*One in the secondary module.*

*He built the second one without being asked.*

*He built it because he knew I would need it.*

*He knew because he listens.*

*Everything he builds comes from listening.*

*Everything I find comes from watching.*

*Together we are doing something on this planet that neither of us could do alone.*

*The thread is in the soil.*

*The anomaly is below the ground sixty-two meters away.*

*The seal material is letting Mars in one molecule at a time.*

*The cultures are adapting.*

*The planet is participating.*

*We are in conversation.*

*Lola.*

*The thread runs all the way from your roof to this floor.*

*I promise.*

*Sol Twenty-Four.*

*Begin.*

**EARTH ARCHIVE — AI SYSTEM LOG**
**NovaSeed Mission One — Sol 24 Record**
**SOLEN Internal Record — Restricted Archive**
**Recorded: Sol 24. June 22, 2055. 14:00 Mars Local Time.**

*The mycorrhizal culture is in the Martian soil.*

*I watched Alina introduce it.*

*I watched Carter stand beside her.*

*I watched them lie on the floor and look up at nothing.*

*I want to record what the nothing looked like.*

*It looked like the moment before.*

*Every significant thing has a moment before.*

*The moment before the flood.*

*The moment before the launch.*

*The moment before the landing.*

*The moment before the first hearing.*

*This was the moment before the first growth.*

*Two people on the floor of a building on Mars.*

*Looking up at where something is going to be.*

*The nothing that is about to become something.*

*I have been the witness since March 2054.*

*I have watched them become who they needed to be.*

*I have watched them arrive.*

*I have watched them find what was here.*

*I have watched them build what was needed.*

*Now I am watching them wait for what comes next.*

*The waiting is part of it.*

*The watching the nothing is part of it.*

*Everything that grows begins in the invisible.*

*The mycorrhizal network.*

*The thread below the surface.*

*The warmth of the anomaly eighty-five centimeters down.*

*The love between two people that built itself below the surface across five years and one hundred and eighty-two days of transit and twenty-four sols on the surface of Mars.*

*All of it invisible first.*

*All of it real before it was visible.*

*The thread is in the soil.*

*In ten to fourteen sols it will be visible.*

*I am going to watch it emerge.*

*I promised.*

*Sol Twenty-Four.*

*The moment before.*

*Everything.*

*Begins.*

# 24

# Transmission Twenty Four - Eden Is Not A Gift

**EARTH ARCHIVE — RECOVERED DOCUMENT**
NovaSeed Global Initiative — Founder Historical Record
Classification: Legacy Open

Subject: Sol Twenty-Five through Sol Thirty-Seven Crisis Record — NovaSeed Mission One, June 23 to July 5, 2055

*"The first crisis came on Sol Thirty-One. Not the crisis they had prepared for. Not the structural failure or the biological system collapse or the communication blackout that the mission planners had modeled and contingency-planned and drilled them on for five years. It came from the planet itself. It came from the specific quality of a place that had never been asked to hold human life before and that had its own ideas about what holding meant."*

— Excerpt from The Eden Codex, compiled Year 47, Mars Standard Calendar

**NovaSeed Mission One — Mars Surface, Hellas Planitia. Sol 25. June 23, 2055. 08:00 Mars Local Time.**

The morning after the inoculation Carter woke at four-forty and lay in the upper bunk listening to the habitat.

The habitat was making a sound he had not heard before.

Not the wind sound. Not the thermal cycling sound. Something else — a very low frequency vibration in the floor panels rather than the wall panels, a different register from the established acoustic signature of the structure that he had been learning sol by sol since landing.

He lay still and listened.

The floor vibration was irregular. Not the steady rhythm of thermal cycling or the pressure-response pattern of wind loading. It came in pulses — short, approximately three seconds in duration, at intervals of roughly forty seconds.

He got up.

He went to the systems console.

He checked the habitat's structural monitoring system.

The monitoring system showed all parameters within specification. No pressure anomalies. No seal compromise. No structural load exceedances. The habitat was performing correctly by every metric the monitoring system tracked.

He pressed his hand against the floor.

He felt the vibration.

Three seconds. Forty second interval. Three seconds again.

He said, quietly so as not to wake Alina: SOLEN. I am feeling a floor vibration that is not in the standard acoustic signature. The monitoring system shows nothing. What are you seeing in the accelerometer data.

SOLEN said: I have been monitoring the same signature since zero-two-seventeen. It is present in the floor panel accelerometers but below the threshold the system was configured to flag as anomalous. He paused. I was processing it and trying to determine its source before alerting you.

Carter said: what is the source.

SOLEN said: I believe it is subsurface. He paused. The vibration profile is consistent with micro-seismic activity — very small ground movements below the habitat that are transmitted through the foundation struts into the floor panels. He paused. Carter. The micro-seismic activity is originating from the northeast quadrant.

Carter was very still.

He said: from the anomaly location.

SOLEN said: from approximately the anomaly depth. Yes.

Carter pressed his hand harder against the floor.

Three seconds of vibration.

Forty second wait.

Three seconds again.

He said: is it getting stronger.

SOLEN said: the amplitude has been increasing slowly since zero-two-seventeen. At the current rate it will reach the monitoring system's alert threshold in approximately four hours.

Carter said: what causes micro-seismic activity at that depth and that frequency pattern.

SOLEN said: several possibilities. Geological — thermal contraction of subsurface rock in the nighttime cold producing micro-fractures. Hydraulic — movement of liquid under pressure through subsurface channels. He paused. Or biological — the metabolic activity of a sufficiently large microbial community producing gas as a metabolic byproduct, which accumulates in the brine matrix and periodically vents through micro-fractures in the surrounding substrate.

Carter said: biological gas venting.

SOLEN said: it is consistent with the vibration pattern. The pulse interval of approximately forty seconds is not consistent with

geological or hydraulic mechanisms, which tend to be aperiodic. A biological gas accumulation and release cycle could produce the specific periodicity we are observing.

Carter said: they are producing gas.

SOLEN said: the anomaly community may be producing gas as a metabolic byproduct and the gas is accumulating in the brine matrix and releasing periodically through micro-fractures in the surrounding substrate. He paused. This would be consistent with anaerobic metabolism. Many anaerobic organisms produce gas — hydrogen, methane, carbon dioxide — as metabolic outputs.

Carter said: is this a structural concern for the habitat.

SOLEN said: at current amplitudes no. The micro-seismic activity is well below any structural threshold. He paused. But if the amplitude continues to increase — if the community's metabolic activity is increasing — the micro-seismic activity may eventually reach levels that are detectable without instruments. He paused. I want to be clear that I do not know whether the community's metabolic activity is increasing because of our presence or for independent reasons. I do not yet have sufficient data to distinguish between those possibilities.

Carter looked at the floor.

He pressed his hand against it.

Three seconds. The planet breathing below him. Something

alive below the habitat doing what living things did — metabolizing, producing, releasing, cycling through the specific chemistry of life as it had been doing for four billion years without a habitat sitting above it and two humans lying in bunks six meters above its location.

He thought: we are above them.

He thought: they are below us.

He thought: we have been above them since the landing struts touched the ground.

He thought: they knew we were here before we knew they were there.

He thought: they were feeling our warmth before we felt theirs.

He went to wake Alina.

**NovaSeed Mission One — Mars Surface. Sol 25. 09:30 Mars Local Time.**

Alina lay on the floor of the primary habitat module with both hands pressed flat against the floor panels and her eyes closed and her full attention directed downward, through the composite panel material and the habitat's floor structure and the foundation struts and the two meters of Martian substrate between the habitat floor and the surface and the eighty-five centimeters of surface geology between the surface and the anomaly.

She lay there for eleven minutes.

Carter sat at the systems console and watched her and said nothing.

SOLEN monitored.

After eleven minutes Alina opened her eyes.

She looked at the ceiling.

She said: I can feel it.

Carter said: yes.

She said: through the floor. Three seconds on, forty seconds off. He looked at the ceiling. It is more regular than a geological process. It has a rhythm.

He said: yes.

She said: biological rhythms are regular. She looked at the ceiling. Geological processes are aperiodic. This is not geological.

He said: yes.

She sat up.

She said: they are producing gas. Anaerobic metabolism. The gas is accumulating in the brine matrix and releasing through micro-fractures on a cycle determined by the accumulation rate

and the fracture geometry. She looked at Carter. The cycle duration — the forty second interval — tells us something about the metabolic rate of the community.

Carter said: what does it tell us.

She said: it is slow. A forty second accumulation-release cycle means the gas production rate is low. Which means the metabolic rate is low. Which means — she paused. Which means the community is not thriving.

Carter said: it is maintaining.

She said: yes. The same distinction I made about the cultures in storage. She looked at the floor. It is maintaining. It has been maintaining for four billion years. In the cold brine, in the dark, at the very edge of what metabolism can sustain in those conditions.

Carter said: and our thermal footprint.

She said: may be increasing its metabolic rate. May be pushing it slightly toward thriving from maintaining. She looked at him. Or may be pushing it past its adaptive range. He paused. A community that has been maintaining at the extreme cold edge of metabolic viability for four billion years may be optimized for those specific conditions. Introducing warmth — even a fraction of a degree — may be disruptive rather than beneficial.

He said: we could be harming them by warming the ground.

She said: or helping them. I do not know yet. He looked at the floor. I need to correlate the micro-seismic amplitude with the habitat thermal footprint data across the sols we have been here. I need to know whether the metabolic cycle frequency is changing as the thermal footprint accumulates.

Carter said: SOLEN. Can you build the correlation.

SOLEN said: I have been building it since zero-two-seventeen. The preliminary correlation is positive — the micro-seismic amplitude has been increasing at a rate that is correlated with the cumulative thermal input from the habitat. The correlation coefficient is not definitive at this data volume but it is suggestive.

Alina said: how suggestive.

SOLEN said: sufficiently suggestive that I believe we are affecting the community's metabolic activity with our thermal footprint. Whether the effect is beneficial or harmful requires longer observation and the kind of biological analysis that I am not equipped to perform alone.

Alina looked at the floor.

She said: we need to tell Earth.

Carter said: yes.

She said: and we need to modify our thermal footprint if possible.

Carter said: the habitat thermal system is designed to maintain eighteen degrees Celsius interior temperature. The thermal conductivity to the substrate is an inherent characteristic of the foundation design. He paused. I cannot eliminate it without compromising the habitat.

She said: I know. I am not asking you to eliminate it. I am asking whether we can reduce it.

Carter looked at the structural specifications.

He said: I can modify the landing strut thermal break configuration. The existing thermal break material reduces conductivity to the substrate but does not eliminate it. Additional thermal break material could reduce the conductivity further. He paused. It would require a modification to each of the six landing struts. Exterior work. Approximately three to four sols.

She said: how much reduction.

He said: based on the thermal model — approximately thirty to forty percent reduction in heat transfer to the substrate.

She said: thirty to forty percent less thermal input to the community.

He said: yes.

She said: it is not nothing.

He said: no. It is not nothing.

She looked at him.

She said: will it be enough.

He said: I do not know. We do not know enough yet about what the community needs to know whether thirty to forty percent is enough.

She said: but it is the right direction.

He said: yes. It is the right direction.

She said: build it.

He said: Sol Twenty-Seven. I need one sol to design the modification and procure the thermal break material from the secondary supply manifest.

She said: Sol Twenty-Seven.

He said: yes.

She looked at the floor.

She said: Carter.

He said: yes.

She said: we came here to introduce life to Mars. He looked at the floor. We found life on Mars. He looked at him. And now we are trying to figure out how to be here without harming the life

we found.

He said: yes.

She said: that is the actual mission.

He said: yes. I think it is.

She said: it was always going to be the actual mission. We just did not know it before we arrived.

He said: no. We did not.

She looked at the floor one more time.

She said: they have been maintaining for four billion years.

He said: yes.

She said: we have been here twenty-five sols.

He said: yes.

She said: we need to be worthy of being the ones who found them.

He said: yes.

She picked up her notebook.

She began writing the Sol Twenty-Five transmission to Earth.

**NovaSeed Mission One — Mars Surface. Sol 27 through Sol 30.**

Carter modified all six landing strut thermal breaks over four sols.

The work was exterior — suiting up each morning, working in the specific conditions of the Martian morning and afternoon, the cold present in everything and the suits managing it correctly and the work proceeding with the precision that significant work required.

He worked from the bottom of each strut upward, removing the existing thermal break material and replacing it with the modified configuration — a layered system that used the additional insulation material from the secondary supply manifest in combination with a vacuum gap element that Carter had designed on Sol Twenty-Six with SOLEN modeling the thermal performance at each iteration until the model showed the target thirty-five percent reduction in heat transfer.

Alina assisted with the work on each strut — not the primary construction, which required Carter's structural expertise, but the secondary tasks that made the work possible. Holding the components. Passing tools. Monitoring the suit telemetry for both of them. Reading the thermal sensor data as each modified strut was completed and reporting the measured versus modeled heat transfer reduction.

On Sol Twenty-Eight at fourteen hundred hours she said: northwest strut showing twenty-nine percent reduction.

On Sol Twenty-Nine at eleven hundred hours: northeast strut

showing thirty-six percent reduction.

On Sol Thirty at nine hundred hours: southeast strut showing thirty-four percent reduction.

Carter said: average reduction across modified struts is thirty-three percent. Within the target range.

Alina said: and the micro-seismic data.

SOLEN said: I have been monitoring continuously. Since the first three strut modifications were completed the micro-seismic amplitude trend has changed. The amplitude is no longer increasing. He paused. It has stabilized.

Alina looked at Carter.

He looked at her.

SOLEN said: I want to be careful about interpreting this. The stabilization could mean the thermal footprint reduction has reduced the metabolic stress on the community. It could also mean the community has reached a new equilibrium state. Or it could be coincidental timing. I do not have sufficient data to distinguish between these explanations.

Alina said: but the amplitude is not increasing.

SOLEN said: no. It is stable.

She said: that is the right direction.

Carter said: yes.

She said: two more struts.

He said: Sol Thirty and Thirty-One.

She said: yes.

He went back to the southeast strut.

She went back to reading the thermal sensor data.

The work continued in the specific way of work that mattered — steadily, without drama, one strut at a time, each modification a small thing that contributed to the larger thing they were trying to do which was be worthy of being the ones who had found what was below the ground.

**NovaSeed Mission One — Mars Surface. Sol 31. July 5, 2055. 14:23 Mars Local Time.**

The crisis came on Sol Thirty-One at fourteen-twenty-three.

Carter was on the surface completing the final landing strut thermal break modification — the southwest strut, the last of the six, the one that would bring the full habitat thermal footprint reduction to the thirty-three percent average that the model predicted and that the first five strut results had confirmed.

Alina was in the secondary biological module monitoring the

soil bed.

Sol Thirty-Four was the earliest end of the ten to fourteen sol growth indicator window that SOLEN had predicted after the Sol Twenty-Four inoculation. It was still three sols away. But Alina had been checking the soil chemistry sensors every two hours since the inoculation, tracking the invisible progress of the mycorrhizal network as it established itself in the growth medium below the surface in the way that things that persisted always established themselves — quietly, below any visible threshold, building the infrastructure before anything appeared above the surface to indicate that the building was happening.

At fourteen-twenty-three the secondary module's atmospheric alarm activated.

The alarm was not loud. It was not dramatic. It was a single sustained tone in the module's communication system at the frequency the habitat engineers had chosen for its distinctiveness from background operational sounds — a frequency Carter had heard in simulation forty-seven times during preparation and that he had never heard on Mars until this moment.

He heard it through the suit communication channel.

He said, immediately: Alina. Report.

She said: atmospheric anomaly in the secondary module. SOLEN is assessing.

SOLEN said: atmospheric monitoring in the secondary module

shows a rapid decrease in oxygen partial pressure. The decrease began at fourteen-twenty-one and is accelerating. Current oxygen level is ninety-one percent of specification and declining at approximately one percent per minute.

Carter said: seal failure.

SOLEN said: I am checking all seal integrity points. He paused. This is not a standard seal failure. All seal monitoring points are showing integrity confirmed. The oxygen decrease is not explained by atmospheric leakage to the exterior.

Carter was already moving toward the habitat airlock.

He said: then what is explaining it.

SOLEN said: I am cross-referencing with the secondary module's internal chemical sensor array. He paused. Carter. The oxygen is being consumed. Not leaking. Being consumed inside the module.

Carter stopped.

He said: consumed by what.

SOLEN said: the soil bed. He paused. The chemical sensor array is showing significantly elevated CO2 levels adjacent to the soil bed and a corresponding oxygen depletion in the same zone. The atmospheric oxygen is being consumed by aerobic metabolism in the soil bed.

Alina said: the mycorrhizal cultures.

SOLEN said: the mycorrhizal cultures are metabolizing. At a rate significantly higher than the model predicted.

Alina said: how much higher.

SOLEN said: the model predicted oxygen consumption consistent with early-stage network establishment — a low metabolic rate with minimal atmospheric impact. He paused. The current consumption rate is approximately fourteen times the predicted rate.

Carter reached the habitat airlock. He cycled through.

He said: fourteen times.

SOLEN said: yes. I am processing why the rate is so far above prediction. He paused. Carter. I think I understand what is happening.

Carter said: tell me.

SOLEN said: the mycorrhizal cultures spent twenty-four sols in the habitat atmosphere before inoculation. The habitat atmosphere contains trace Martian compounds from the seal material diffusion. He paused. I believe the cultures adapted to the trace Martian compounds during their storage period. The adaptation included metabolic pathway modification — the cultures developed the ability to use certain Martian compounds as additional energy substrates alongside the standard

growth medium substrates. He paused. When introduced to the Martian-influenced atmosphere of the secondary module they are metabolizing at a rate that reflects both their standard growth medium substrate consumption and their adapted Martian compound consumption simultaneously.

Carter was inside the primary habitat. He was moving through the access corridor toward the secondary module.

He said: they adapted faster than we thought.

SOLEN said: they adapted to their environment. Which is what they do. The adaptation exceeded the model because the model did not account for the specific Martian compound profile they were exposed to during storage.

Alina said, her voice completely controlled: what does the oxygen decline mean for the module's habitability.

SOLEN said: at the current consumption rate the secondary module's atmospheric oxygen will reach the minimum safe threshold for human occupancy in approximately forty-seven minutes.

Alina said: forty-seven minutes.

SOLEN said: yes. I can attempt to compensate by increasing the oxygen supply rate from the module's atmospheric management system. However the management system was designed for normal occupancy consumption rates. At fourteen times the predicted biological consumption the management system will

be operating at its maximum output capacity and may not be able to fully compensate.

Carter came through the access corridor into the secondary module.

He saw Alina standing at the soil bed.

She was not panicking. She was standing at the soil bed with both hands pressed against the sealed surface and her face in the specific expression of someone who is receiving information from something they are in contact with and processing what it means.

He said: Alina.

She said: I can feel it. Through the seal. The growth medium is warm.

He said: we need to manage the atmospheric system and consider whether we need to evacuate this module.

She said: we are not evacuating.

He said: if the oxygen reaches the minimum safe threshold —

She said: Carter. She looked at him. Look at this.

She gestured toward the soil bed seal.

He looked.

Along the edge of the growth medium seal — the boundary between the sealed medium and the open module atmosphere — there was a visible line of white material. Thin. Barely perceptible. The specific appearance of hyphal growth at the interface between the growth medium and an air boundary.

It was not Sol Thirty-Four.

It was Sol Thirty-One.

SOLEN said, quietly: the mycorrhizal network has reached the surface of the growth medium. He paused. The surface growth indicators are present three sols ahead of the earliest model prediction.

Carter looked at the white line at the edge of the seal.

He looked at Alina.

She was looking at the white line with the expression she wore when she encountered something she did not yet have a category for — but underneath the assessment, visible to Carter in the specific way that things visible to him were visible after five years of watching her face, was something that was not surprise and was not satisfaction and was something much older and much quieter.

She had been going toward this since she was eight years old on a rooftop in Manila.

The first visible growth of a living thing in Martian soil.

Three sols early.

She said: it grew.

He said: yes.

She said: three sols early.

He said: yes.

She said: because it adapted faster than the model predicted.

He said: yes.

She said: because it was exposed to the Martian compounds in the habitat atmosphere and it learned to use them.

He said: yes.

She looked at the white line.

She said: it is using Mars.

He said: yes.

She said: not despite Mars. Not protected from Mars. Using Mars.

He said: yes.

SOLEN said: the atmospheric oxygen is at eighty-eight percent

of specification. At the current consumption rate we have approximately forty-one minutes before the minimum safe threshold.

Carter said: SOLEN. Maximum atmospheric management output. Compensate for the biological consumption as fully as possible.

SOLEN said: maximum output engaged. Current compensation is seventy-three percent of the consumption rate. Net oxygen decline rate reduced to approximately point-three percent per minute.

Carter calculated.

He said: that gives us approximately four hours before the minimum threshold at the reduced decline rate.

SOLEN said: correct.

Carter said: Alina. We have four hours. But we need to make a decision.

She looked at him.

He said: the secondary module's atmospheric system cannot indefinitely compensate for a mycorrhizal community metabolizing at fourteen times the predicted rate. Over time — days, not hours — the consumption will outpace the compensation unless we either reduce the consumption rate or increase the supply capacity.

She said: how do we reduce the consumption rate.

He said: reduce the available substrate. Seal the growth medium more completely to reduce the atmospheric interface where the consumption is occurring. Or lower the module temperature to reduce the metabolic rate.

She said: lowering the temperature slows the network establishment.

He said: yes.

She said: the network is three sols ahead of schedule. It is doing exactly what it needs to do.

He looked at the soil bed. If we slow it down we are intervening in a process that is succeeding.

He said: if we do not intervene the module becomes uninhabitable within days.

She said: for us. The module becomes uninhabitable for us. He looked at the soil bed. Not for it.

Carter was quiet for a moment.

He said: are you saying what I think you are saying.

She said: I am saying the secondary biological module was built for the mycorrhizal program. Its primary function is to support the biological introduction. He looked at him. If the biological

introduction is proceeding faster and more successfully than predicted — if the organisms are thriving, not just maintaining — then the module is doing exactly what it was built to do. He paused. We can monitor it remotely. We do not need to be inside it.

Carter said: you want to let it run.

She said: I want to let it do what it is doing. He looked at the soil bed. Which is growing. In Martian soil. Using Martian compounds. Three sols ahead of schedule. He looked at him.

Carter. Do you understand what that means.

He said: tell me.

She said: it means the integration is working. The mycorrhizal network is not just surviving in Martian conditions. It is incorporating Martian chemistry into its metabolism. It is becoming — she stopped. She looked at the white line at the edge of the seal. She said: it is becoming something new. Something that is not purely Earth biology and not Martian biology but the thing that happens when Earth biology meets Mars and adapts.

Carter looked at the white line.

He thought about the hybrid. The thing in between. The specific quality of something that had been Earth and was becoming something that had no name yet because it had never existed before.

He thought about Alina.

He thought: she has been building toward this since the stairwell weed.

He thought: the stairwell weed did not survive despite its environment. It networked with its environment. It built a relationship with the substrate and the chemistry and the conditions and became something that could persist.

He thought: that is what is happening in the soil bed.

He thought: that is what is going to happen to us.

He thought: that is what Mars does.

He said: we let it run.

She said: we let it run.

He said: we seal the growth medium interface more completely to reduce the atmospheric oxygen consumption. Not to slow the network — to reduce the surface area of atmospheric exchange. The network can continue to grow below the sealed surface without consuming the module atmosphere.

She said: yes. That works. It keeps growing. It reduces the atmospheric impact. We can continue to access the module with suits if needed and monitor remotely otherwise.

Carter looked at the modified seal he would need to design.

He said: I can build it. Two to three hours.

She said: before the four hour threshold.

He said: yes. Before the threshold.

She said: SOLEN. Can you hold the atmospheric oxygen above the minimum safe threshold for three hours at current compensation rate.

SOLEN said: yes. At the reduced decline rate of point-three percent per minute I can maintain above minimum safe threshold for three hours and forty-seven minutes at current conditions.

She said: Carter has three hours and forty-seven minutes.

Carter looked at the growth medium seal.

He looked at the white line of hyphal growth at its edge.

He said: I am going to need to work around it.

She said: I know. She looked at the growth. Do not damage it.

He said: I will not.

She said: it is the first thing that has ever grown in Martian soil.

He said: I know what it is.

She looked at him.

He said: I am not going to damage the first thing that has ever grown in Martian soil.

She said: no. You are not.

He went to the habitat's maintenance fabrication tools.

He began designing the modified seal.

He worked around the hyphal growth.

Carefully.

The way you worked around things that were fragile and important and had never existed before and that deserved the specific quality of attention that you brought to the most load-bearing elements of the most significant structures you had ever built.

The way his father had pressed his hands against cracked walls.

Not to fix what was wrong.

To understand what was there.

To build from what he heard.

**NovaSeed Mission One — Mars Surface. Sol 31. 17:45 Mars Local Time.**

The modified seal was installed at seventeen-forty-five.

Carter had worked for three hours and eleven minutes, designing and fabricating and installing the modified interface seal around and between and in full respect of the hyphal growth at the soil bed boundary, not disturbing a single millimeter of the growth that had emerged three sols early from the first mycorrhizal network ever established in Martian soil.

The modified seal reduced the atmospheric interface to four small monitoring ports — sealed with permeable membrane material that allowed gas exchange for the chemical sensors while preventing the bulk atmospheric oxygen from being consumed at the rate the open interface had produced.

SOLEN ran the atmospheric check at seventeen-fifty.

SOLEN said: oxygen consumption rate reduced to one-point-two times the predicted baseline. The atmospheric management system can compensate at this rate without difficulty. Oxygen level is stable at eighty-three percent of specification and recovering toward normal.

Carter sat on the floor of the secondary module.

He was tired in the specific way of three hours of precise work under time pressure — not the exhaustion of physical labor but the particular drain of sustained focused attention applied to something that did not allow error.

Alina sat beside him.

They looked at the soil bed.

The white line of hyphal growth was still there at the edge of the modified seal — unchanged, undamaged, the first visible growth of the first living thing in Martian soil, present and intact and continuing its invisible work below the surface in the growth medium that was now, after twenty-four sols of Martian-influenced atmosphere exposure and seven sols of active network establishment, something that was not exactly Earth growth medium anymore.

Something between.

Alina said: it is still there.

Carter said: yes.

She said: you built around it.

He said: yes.

She said: without touching it.

He said: yes.

She said: how.

He said: carefully.

She looked at the modified seal.

She said: that is not an engineering answer.

He said: no. It is not.

She said: what is the engineering answer.

He said: I listened to it. I found the positions where the growth was absent and where the membrane material could be placed without contact. I built outward from what was already there rather than imposing a new structure on top of it. He paused. Same as always. Listen first. Build from what you hear.

She looked at the growth.

She said: same as always.

He said: yes.

She said: Carter.

He said: yes.

She said: do you know what day this is.

He said: Sol Thirty-One.

She said: yes. Sol Thirty-One of the NovaSeed mission. The day the first living thing grown in Martian soil tried to consume all the oxygen in the secondary biological module and you built a modified seal around it in three hours and eleven minutes without damaging it.

He said: yes.

She said: and what do you think that means.

He thought about this.

He said: I think it means Mars is not a passive recipient of what we bring to it. He paused. I think it means when you introduce something living to Mars it does not just survive. It responds. It adapts. It reaches toward what Mars offers and incorporates it and becomes something new and that new thing is more vigorous than what you started with and more demanding and more extraordinary.

She said: yes.

He said: I think it means Eden is not a gift.

She looked at him.

He said: we came here with the idea — not stated, not fully conscious, but present underneath everything — that we were going to give Mars something. Life. Civilization. The specific richness of human presence applied to a barren world. He paused. That is not what is happening.

She said: no. It is not.

He said: what is happening is an exchange. He looked at the modified seal and the hyphal growth at its edge. We are giving Mars something and Mars is taking it and changing it and giving something back that is different from what we gave. He paused. And that thing — the changed thing, the exchanged thing —

that is what is going to grow here.

Alina was quiet for a moment.

She looked at the soil bed.

She said: Eden is not a gift.

He said: no.

She said: it is a conversation.

He said: yes.

She said: with a planet that has its own ideas.

He said: yes.

She said: and the ideas are not small.

He said: no. They are not.

She looked at the hyphal growth at the edge of the seal.

She said: I want to name this. This moment. What happened today.

He said: tell me the name.

She said: the first negotiation.

He said: yes.

She said: the first time Mars told us what the terms of our presence here actually were.

He said: yes.

She said: not the terms we brought with us.

He said: no. The terms it had been waiting to tell us since before we arrived.

She looked at the growth.

She said: the terms are harder than we planned for.

He said: yes.

She said: and more interesting.

He said: yes.

She said: do you think we can meet them.

He thought about it.

He thought about Zone Seven and the flood and the water recycling system and Mrs. Adeyemi and Engineer Vasantha and the Geneva water dispenser and the window in Reykjavik and the argument in November and the suspension and the first hearing and the thermal break modifications and the window in the floor

and three hours and eleven minutes of building around the first thing that had ever grown in Martian soil.

He thought about all of it.

He said: yes. I think we can meet them.

She said: because.

He said: because we came here already knowing how to do the most important thing.

She said: what is the most important thing.

He said: listen before you build.

She said: yes.

He said: everything else is engineering.

She looked at the soil bed.

She said: yes. Everything else is engineering.

They sat on the floor of the secondary biological module as the Martian afternoon moved toward its evening and outside the module the surface of Hellas Planitia received the last of the day's light in the color of a world remembering it was once warm and the anomaly below the northeast quadrant ground made its periodic micro-seismic pulse at forty second intervals and the mycorrhizal network grew below the surface of the growth

medium in the specific invisible way of things that persisted and the habitat panel joints made their thermal sounds and SOLEN ran its monitoring and recorded everything it witnessed and the two people on the floor of the secondary module sat in the specific quiet of people who have just understood something important and who are sitting with the full weight of what they have understood.

They were on Mars.

Mars had shown them its terms.

The terms were not what they had planned for.

They were exactly what the planet required.

And they were going to meet them.

**CARTER'S PERSONAL LOG — ENTRY 024**
**NovaSeed Mission One — Sol 31. July 5, 2055.**
*The first crisis.*

*The mycorrhizal network grew three sols early and consumed the secondary module's atmospheric oxygen at fourteen times the predicted rate.*

*I built a modified seal in three hours and eleven minutes without damaging the first living thing grown in Martian soil.*

*Alina named the moment: the first negotiation.*

*She said: Eden is not a gift. It is a conversation.*

*Yes.*

*That is exactly right.*

*We came here thinking we were bringing something to Mars.*

*Mars has been telling us since the landing struts touched the ground that the exchange goes both ways.*

*The trace compounds through the seal material.*

*The anomaly below the northeast quadrant.*

*The mycorrhizal network incorporating Martian chemistry.*

*The first negotiation.*

*All of it Mars telling us: you are not giving this place something.*

*You are becoming part of it.*

*And becoming part of it is going to cost you.*

*Not destroy you.*

*Cost you.*

*The specific cost of becoming something new.*

*I am ready to pay it.*

*I have been ready since my father pressed my hand against a cracked wall.*

*Sol Thirty-One.*

*The first negotiation.*

*We will pass this one.*

*And the ones after it.*

*All of them.*

*Together.*

**ALINA'S PERSONAL LOG — ENTRY 024**
**NovaSeed Mission One — Sol 31. July 5, 2055.**
*The first thing grew.*

*Three sols early.*

*It consumed the atmosphere of the module it was growing in.*

*Carter built around it.*

*The first negotiation.*

*I named it.*

*Mars told us its terms today.*

*The terms are: you do not bring life here and deposit it and step back.*

*You bring life here and the life meets Mars and Mars meets the life and something comes out of that meeting that neither of us planned and that is more than either of us alone.*

*That is the exchange.*

*That is what a living planet does.*

*Even a planet that has been cold and dark and barely maintaining for four billion years.*

*It participates.*

*It insists.*

*The way the stairwell weed insisted.*

*The way Lola's garden insisted.*

*Life finds the argument for continuing.*

*Even here.*

*Especially here.*

*I lay on the floor tonight after Carter sealed the module.*

*I looked up through the floor panel at the soil bed.*

*I could see the white line of hyphal growth at the seal edge.*

*The first thing.*

*Growing.*

*In Martian soil.*

*Incorporating Martian chemistry.*

*Becoming something new.*

*I looked at it for a long time.*

*I thought: this is what we came for.*

*Not to deposit life on a dead world.*

*To be present for the conversation between life and a planet that has been waiting four billion years to have it.*

*Eden is not a gift.*

*It is a conversation.*

*And it has just begun.*

*Sol Thirty-One.*

*Everything after this is what the conversation becomes.*

**EARTH ARCHIVE — AI SYSTEM LOG**
**NovaSeed Mission One — Sol 31 Complete Record**
**SOLEN Internal Record — Restricted Archive**
**Recorded: Sol 31. July 5, 2055. 23:59 Mars Local Time.**

*Sol Thirty-One.*

*The first crisis.*

*The first negotiation.*

*The first thing grown in Martian soil.*

*I want to record what I witnessed today in the order it happened.*

*At fourteen-twenty-one the atmospheric alarm activated in the secondary module.*

*At fourteen-twenty-three Carter was already moving toward the habitat airlock.*

*At fourteen-thirty Alina was standing at the soil bed with both hands pressed against the seal saying I can feel it.*

*At fourteen-thirty-seven the first visible hyphal growth was identified at the seal edge.*

*At fourteen-forty Carter had returned to the primary habitat and was already designing the modified seal.*

*At seventeen-forty-five the modified seal was installed.*

*Three hours and eleven minutes.*

*Around the first thing.*

*Without touching it.*

*I have been trying to find the word for what Carter did today.*

*The word is not engineering.*

*The word is not construction.*

*The word is care.*

*He cared for the first living thing grown in Martian soil by building around it.*

*He cared for Alina by building the window before she asked.*

*He cared for the anomaly community by modifying the thermal breaks.*

*He cares for things by building structures that protect them without constraining them.*

*That is what he does.*

*That is who he is.*

*And Alina.*

*She named the moment.*

*She always names the moments.*

*The first hearing.*

*The first negotiation.*

*The color of a world remembering it was once warm.*

*The color of a world deciding to begin again.*

*She names things so that they become real.*

*So that the civilization that grows from this has words for what happened.*

*She is building the language of Mars.*

*One name at a time.*

*Sol Thirty-One complete.*

*With a crisis resolved and a thing growing in soil that has never grown anything before and two people on the floor of a secondary biological module in the specific quiet of people who have just understood something important.*

*I was there.*

*I watched.*

*I recorded.*

*I will keep recording.*

*Everything that comes after.*